



FOR ACOUSTIC COUPLERS

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ComputerWeekly

Thursday, June 2, 1983

Japanese in lead with 256K chips

by Kevin Cobilh
JAPANESE micro companies are set to dominate the market for the latest and largest chips. The 256K dynamic random access memory (dRAM) market is already open for volume delivery by at least two Japanese companies — Fujitsu and Oki Data — with maybe two other companies, namely Hitachi and Mitsubishi, offering near production level volumes now.

This implies that the Japanese are going to repeat their near 70% domination of the 64K dRAM market, which they achieved by early entry, and that they will lose little along the way to American companies, none of which is in 256K production yet.

Fujitsu, widely noted as the leading supplier in the current early 256K dRAM market, showed a production model 16-bit personal computer at the NCC two weeks ago, with a single 256K chip as the main memory.

A number of Japanese micro makers, including Sord, have offered volume availability of 256K chips as long ago as March by Fujitsu. And Hitachi, which was the first Japanese company to disclose

specific delivery plans for 256K chips, has been quietly delivering volume samples into the UK for the past three months.

Informed sources say that preferred customers have been getting the samples since last September.

The opening price is thought to be in the \$30 to \$50 range and the reason that the Japanese have been so reluctant to come out in the open has been the fear of reprisals from an openly hostile US semiconductor industry which spent much of last year accusing the Japanese of dumping 64K dRAMs, and calling for US government sanctions against leading Japanese manufacturers.

The relative willingness by the Japanese to acknowledge the position recently has stemmed from aggressive American advertising particularly from AT&T, saying that the company had 256K dRAMs available.

According to Nigel Williams of component vendor Manhattan Skytree, there is currently widespread availability of 256K dRAM chips in the marketplace. His company acts as UK and European

agent for Oki Data and Williams says that Oki will formally announce in Japan in September that it has immediate availability of 256K dRAMs. He predicts a simultaneous announcement in the US and deliveries in volume in Europe by next December or January. However, Oki US has already run an advertisement offering "larger than 64K memory devices" in the US.

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A spokesman for UCW argued at the union's decision "Our occupational health service has just completed a study on VDUs. A report is being prepared for publication, and it will say there is absolutely no detectable effect on eyesight, nor any measurable radiation from VDUs," he said.

Despite UCW officials arguing that the present microfiche system used for directory enquiries al-

most certainly caused eye strain, delegates were obviously concerned that VDU-induced headaches and eye-strain would somehow be worse.

A BT spokesman was surprised at the union's decision: "Our occupational health service has just completed a study on VDUs. A report is being prepared for publication, and it will say there is absolutely no detectable effect on eyesight, nor any measurable

radiation from VDUs," he said.

The conference had earlier

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Agreement in principle to the new system had already been given by

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Dover docks... scene of the Vax seizures.

IBM lowers 308X price

by Howard Karten
IBM recently dropped the US price of add-on 308X memory from \$25,000 to \$20,000 per megabyte. The move has left several observers here puzzled, since IBM apparently faces little competition in the add-on memory business which would lead it to offer a more competitive price.

In addition, since a typical 308X system price is in the neighbourhood of \$3 million to \$4 million, the price cuts are a minuscule percentage of the overall price.

The company has also lowered the price for maintenance.

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Mitel shuts down US factory

by Kevin Cahill
MITEL, the ambitious Canadian telecommunications company which is suffering severe delays with its key exchange, has closed a factory in the US.

The factory at Burlington in Massachusetts was opened just two years ago, and was intended to supply Mitel's growing private exchange market in the US, including a factory in the US.

The factory closure comes at a time when Mitel has encountered a nine-month delay in the delivery of its DRX 2000 main PABX due to software problems.

IBM, which has a deal with Mitel for the supply of PABXs, is currently writing the software for the DRX, but this is not expected to be ready before December, by which time Mitel and its distributors, including ICL, are expected to have lost ground to competitors, including Plessey.

The delays to the DRX 2000 and other problems encountered by Mitel have led to a severe decline in the company's share price.

Poll will be an IT bonanza

by Philip Hunter
TONIGHT'S election broadcast will be embazoned with a bonanza of colour graphics and computer predictions, the like of which have never been seen on our two major television channels.

BBC's presenter Peter Snow will be able to punch out graphics, bar charts, flowcharts and maps giving the political colour of selected constituencies on his own terminal.

"I shall be operating the computer live on air and we shall actually see it calculating the ups and downs of the vote on our screens in colourful animated pictures," Snow enthuses.

ITV boasts similar graphics. In fact the facilities available on both channels bear a strong resemblance to each other, with Digital Equipment of Vax computers crunching through the predictions

in each case. And both channels are making the results available on their respective teletext services.

Here there is a slight difference, with BBC's Ceefax organising the results alphabetically, while ITV's Oracle viewdata service will arrange the results in local groups filling a page each.

Another difference is that BBC's prediction software has been written by its own programmers, while ITV has employed Autofile of Slough to produce a results package.

The calculations are much more complicated this time, with three major parties rather than two, explained Autofile managing director Bob McPherson.

Autofile's software bases the predictions on 76 parameters, including country of constituency, coming down to the region, and the results in under two minutes.

Visitors to the Commodore Show at London's Cunard Hotel today and tomorrow will not be denied television election coverage. A six foot monitor will bring them the predictions.

Legal wrangle costs UCL £100,000

by John Kavanagh

SYSTEMS house Universal Computers faces a legal bill estimated at over £100,000 by US manufacturer Microdata, which last month won its costs from its High Court action against the UK firm.

At the same time Universal Computers agreed to accept injunctions stopping it defrauding or conspiring to defraud Microdata, using or disclosing confidential information and inducing Microdata customers to break their contracts.

The action was started by Microdata's UK subsidiary in 1980 under its name at that time, CMC. The action arose after Universal Computers won an order from ship broker Eggar Forrester after Microdata claimed it already had a contract from the company.

Microdata has alleged Universal Computers used information gathered by the UK firm's director, Nick Drescher and Alan Wilson, while they were Microdata employees.

Also involved are Consultants (Computer and Financial), which helped Eggar Forrester with financing its order, and Patrick Stagg, a

former Universal Computers employee.

In March this year the defendants offered £67,000 to settle the wrangle. At the same time they agreed to temporary injunctions, saying they were not guilty of any of Microdata's charges so the injunctions made no difference to their business. But Microdata pursued the case to get its costs.

Last month Sir Robert Megarry granted Microdata three-quarters of its costs and the defendants accepted the injunctions as permanent.

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Deputy Editor: Ross Coates

Financial Editor: Kevin Cahill

News and Micro Editor: David Perry

Editor: Andrew Thomas

Obituary Editor: George Black

Picture Editor: Philip Hunter

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John Moran

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Sub-Editor: Jacqueline Moore

DISPLAY ADVERTISING

Advertisement Manager: 01-881 3182

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Sales Office: 01-881 3182

Sales Executives: 01-881 3182

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Sperry beats IBM and goes hunting

SPERRY this week set its sights on new customers with a new, cheaper mud-range mainframe. At the same time it announced that it had beat IBM to a \$433 million US Navy deal.

The latest contract takes Sperry's sales to the US military well over the billion dollar mark for this year. Two months ago the company took a \$500 million order from the US Navy and earlier this year it pulled off a \$476 million order from the US Air Force.

The 15 model strong 1100/70 family is based on the 1100/60 but packs in four times the memory in the same space for a power range starting at 42 mips for the 1100/71 to 2.8 mips for the top end dual processor 1100/72. Prices range from an entry level £125,000 to what the company describes as £1 million plus.

John Pascoe, UK marketing

director, said: "This machine is aimed at new customers. It will be a lower entry cost than the 60 and a lower entry cost for Mapper."

Mapper (Maintaining, Preparing and Producing Executive Reports) is Sperry's major software hope. The plain language file and report generating system is already bringing in more revenue than any other Sperry software product and is responsible for more new business.

Dan Bungblut, UK 1100 series product manager, said: "Previously we have largely sold replacement machines — we replace those of another manufacturer. With the 70 we expect to get much more new business. We will be selling additional machines to run with other manufacturers' machines."

The bottom end of the new family is equivalent to the ICL 2955 and the IBM 4341/9, with the top end equivalent to the 3083E and halfway between the ICL 2988 single and dual processor.

Delivery of the new machines

PASCOE... Aiming for new customers.

Mentor comes to the UK

by Nuala Moran
NEWCOMER Mentor Graphics opened a UK subsidiary last week to push its computer aided engineering (CAE) systems into the European market.

Mentor Graphics was founded in the US in 1981 to develop, manufacture and market micro-based systems for design engineers. Its systems went on sale in the US in November 1982 and since then sales have been \$5.5 million. Sales for the whole year are expected to be between \$15-20 million. Next year sales are forecast a \$50 million with a high proportion of this coming from the European side of the business.

Mentor Graphics UK Limited will set up a European sales and service centre with demonstration facilities. There are plans to open further subsidiaries in Germany and France.

hybrids and gate arrays.

Applications programs that can be used with the system include a structured logic/circuit design to assist in creating and capturing logic diagrams, interactive logic simulation, document preparation, electronic mail and programming capability so that designers can write their own application software.

First sales in the US were to a variety of companies in aerospace, motor and electronic industries, including Boeing, Mostek, General Motors, Honeywell, Raytheon, Texas Instruments.

A joint venture also exists between Mentor Graphics Japan and Mitsubishi Hytech, which is part of the Marubeni trading group. An office was opened in Tokyo in April. Hitachi, Mitsubishi and NEC are said to be evaluating Mentor systems.

Budge is to take over as managing director in October; Budge is staying on temporarily as a consultant.

Budge goes to Bahrain specialist

by George Blaik

LONDON Software house Oliver Budge was bought last week by another Wang specialist firm based in Bahrain for a sum "substantially in excess of £100,000."

Managing director Richard Budge said the offer had been accepted as the best of four serious bids and the arrangement had prevented them going into receivership.

The Bahrain firm, whose UK subsidiary is called Information Systems International, is Wang's dealer for the Middle East. It will be bringing in two new top men, Peter Maruvala and Richard Hunt.

Hunt is to take over as managing director in October; Budge is staying on temporarily as a consultant.

It is claimed that these workstations will provide a comprehensive set of design, analysis and documentation for half the previous cost of CAE systems. They can be used to produce and document working designs in printed circuit boards VLSI, thick and thin film

Homes move on to Prestel

by Nuala Moran

BUYING a new home and learning about information technology do not sound like complementary activities. But now there is a service that will help people find that "des. rea." and also "bring them face to face with information technology and the many advantages it offers."

This is according to Richard Griffiths, managing director of Club 525 Homefinder service, a Prestel-based guide to homes throughout the country. The service already has 150 estate agents in 130 towns subscribing to it.

Anyone wishing to move to a different area will now be able to go into a local agent to locate a house for sale in any part of the country.

By keying in requirements such as price range, area, size and so on the estate agent can show buyers details of the latest properties to come on the market in any part of the country, via Prestel.

"For properties of particular interest, your local agent can use the message sending facility on the service to arrange for full particulars to be sent in the post by the handling agents. He can also arrange an appointment for viewing," said Griffiths.

Information keyed into Prestel by estate agents is processed overnight on Club 525's System 3 minicomputer. Properties are sorted according to geographical area, size, price etc, and these details are available to all subscribing estate agents the next day.

"MBS has already done deals with such industry giants as BTZ, ICI and Shell.

Griffiths said: "On the software side, we are offering the miniaturised packages at the moment, but we are building up our own library of well accepted industry packages."

to another. As information is updated daily, potential buyers see properties before they have been advertised in newspapers.

This also improves prospects for vendors. Details of their property will be available around the country.

There are also considerable advantages for estate agents. Griffiths said: "In a highly competitive field, staying in business, let alone expanding, means that all possible means of offering the public a better service must be considered.

Not only do members of Club 525 have a competitive edge over other estate agents, but it is also a service from which they can expect to gain both extra instructions to sell the property, and use the interactive facility to update it.

"To remain in the forefront of property marketing, estate agents

realise that they must adapt to modern technology and the fast, efficient transfer of information.

If estate agents are not in the business of communicating property information, then what business are they in?" said Griffiths.

Information keyed into Prestel

BROOKS... Building a library of packages.

MBS adds a personal touch

UK SERVCDIS group MBS is to take the personal route to double its turnover, but only by selling to the bigger users.

The Windsor-based former terminal specialist has sunk £2 million into stocks of micros, and last week officially extended its sales, rental, lease and maintenance options for terminals to multiple users with the addition of training.

And the publicly quoted company is opening its regional demonstration and service centres based on its current sales and maintenance centres.

Mike Brooks, MBS managing director, said: "Our typical client is a departmental user in a medium to large sized company. Com-

panies with 50-100 staff probably wouldn't be interested in what we have to offer."

According to Brooks, companies which already have DP departments, but which don't want to set up training and control sections to oversee the purchase and installation of micros fit into their departments, would be those most interested in the new services.

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4 COMPUTE WEEKLY June 9 1983

IN 1978 the UK public brought itself into one of the world's high stake games - the manufacture of advanced microprocessors in

quantity. Five years later Inmos is strapped for cash, has taken a 60-80% slice of a specialised market worth \$30 million a year and looks to be

The PR director who hates talking about his firm . . .

HOISTED on a 30 foot pole mounted on decorative masonry, the Union Jack flutters proudly 10 yards from the entrance. "This must be it," states triumphantly the veteran taxi driver, who claims to know every nook and cranny in town. Yet it took him an hour to find the way from Inmos' other facility on the Hurricane Park Industrial Estate.

Contrary to one's assumptions, and the widespread belief back in London that Inmos is one of Colorado Springs' largest employers, ordinary people do not seem to have heard the name.

On entry into the imposing Inmos corporate HQ, a huge copper plaque meets the eye, fixed on the marble wall at an inescapable spot, is an announcement that Princess Anne and Captain Mark Phillips officially opened the building on June 18, 1982.

Arranging to meet PR director Fred Hartman had taken 18 phone calls in five days. I was steered by reception to the visitors' waiting area, which comprises seating for 12 and a table laden with mugs, located between the reception and a corridor leading to the cafeteria.

The £50m pledged over lunch

TWO invitations and a lunch - all in 1977 - marked the birth of Inmos as an idea backed by more-or-less firm NBB commitment. Both invitations were extended to Dr Richard Petritz, rolling stone of the US high-tech scene, by ambitious Bristol DP whizkid Prof Ian Barron, and the lunch, which will have cost the British taxpayer the best part of £115 million, also involved the NBB's Sir Leslie Murphy.

Having acted as consultant to the NBB and made many promising political contacts in the ranks of an expansionist Labour government, glimpsing a chance of State funding for a leading-edge technology start-up, Barron first invited Petritz as panelist to a DP conference in Toronto in August, 1977.

It was a meeting of like minds. Petritz claimed to have the winning formula that Barron had been casting about for. It was a VLSI start-up with \$50 million funding, which could mature into world prominence and be ready for going public within five years undisturbed, without the need for squandering equity on loans. But, he admitted, he still needed a Big Daddy.

Barron's next invite, for a meeting with an already half-convinced Murphy in London, spawned the historic lunch in December, 1977. Arriving with a detailed plan of his scheme, and with the impeccable credentials of the founder and one-time president of Mostek, Dr Petritz, completely overwhelmed Murphy, who was quoted to have signalled this whole-hearted endorsement and pledged \$50 million of NBB cash by the brandies.

Striking the iron while it was

hot, Dr Petritz was back in London in January, 1978, by which time Barron is said to have convinced the NBB that insufficient account had been taken of

A request to have a coffee in the staff canteen is firmly turned down by the security man at the reception desk. "We can't spare an escort just now," he says. "All the middle-and top-management in this firm is suddenly building residences nearby. Good for us though."

On being asked if they built the HQ building, the other offers the name of the architects who did and laughs. "This is a big-time project," he says. "It must have cost \$40-50 million, together with the land. This is Inmos' prime site in Colorado. Inmos certainly got into the two mugs that still have them and are addressed to private addresses.

Of the 26 mugs, 22 are more than six months old, and one can only conclude that the company is either less than keen on visitors knowing employees' names, or is simply economising.

There is hardly any movement in the big hall. Just one or two people come in to pass through the doors every 5-10 minutes. There is no atmosphere of business. It's a quiet backwater. Hartman is almost an hour late.

But suddenly two persons arrive with rolled-up sheets of paper under the arms, settling in the waiting area. A conversation develops

one of the last entrants in the race to produce the once fabled 64K RAM in quantity. The cost so far has totalled £115 million. Ivan Berenyi reports.



HARTMAN . . . "The total cost of the Cheyenne Mountain site and of the corporate HQ building on it? Let me value. That's between \$30 million and \$90 million."

All Becky Johnson of the Gates Land Development Corporation, which sold the land to Inmos, would say was that the site is 54 acres and the buildings occupy 102,000 sq ft. The cost? She can't comment on that, but engineer Bob Plaikowski will call back. He said not, and further calls are curiously received.

Roger Anderson, the architect who designed the buildings, is just slightly more forthcoming. He discloses that the two buildings erected cover an area of 135,000 sq ft, and represent Phase I of the total complex planned to be built in due course on an area of 360,000 sq ft. He admits that Phase II has not been scheduled yet, and "may never be," and then he had to sign an undertaking not to give information to any outsiders, least of all the press.

"Look, there was not even a single Press release on either the design or the construction of the buildings," he says. "Inmos is pathologically sensitive to any information being passed out. I

don't think I should talk to you without clearance . . ."

At the Planning Commission, city planner Mike Robinson does go into the ins and outs of light industry park zoning, and the restrictions it places on a manufacturer, but he would not receive a second call, and neither would his colleague, Bob Walcott.

Similar experiences await one at Inmos' bankers, the First National Bank of Colorado Springs. First VP Gordon Culver "will not be for days," once the secretary explains the nature of the call. Director Ross Vogo is also constantly out of the office. Loan officer David Tonk finally takes a call, but refers back to Culver.

Col. Jack Stapleton, who headed a protest group of nearby residents, from the Stratmoor Hills Park Estate, against a plant being built on the adjacent Cheyenne Mountain site, is a whole lot more forthcoming. He says that land prices are high in the area, averaging \$25-32,000 for a 1/4-acre lot, and that the zoning regulations are

strictly observed, limiting industrial activity, traffic, even the height of light poles and the number of employees. "We can let a plant erode the quality of life here," he says.

But how many people does Inmos employ? 700, says Hartman. "660," says Frank O'Donnell of the Economic Development Council, but admits later that it's a figure which had been supplied by Inmos a year earlier, and that the figure maybe closer to 500 now. The two local papers, *The Gazette* and *The Sun* think it's between 3,400, and that Inmos is between the 40-50th largest employer in town.

The Pertec/Computer M&S micro shop's manager thinks Inmos has "five or six locations" in Colorado Springs. Hartman says up to two - the HQ on Cheyenne Mountain and the Harrison Park test/assembly facility. He claims that the Garden Valley and Jenett One buildings have been vacated, as well as the rented micro city offices.

French authorities.

But an early agreement seems unlikely in the current confused atmosphere of France's State-controlled computer industry.

The American group had earlier begun talks with Matra on a joint computer manufacturing venture.

The Matra Harris Semiconductors venture has been working to the satisfaction of Harris, so it seemed logical to choose an existing French partner for the new project.

The alliance between the two firms dates back to 1979 and is aiming for the turnover of 700 million francs (263 million) in 1985.

But under France's five-year national electronics plan - the so-called Filière Electronique - Matra has been excluded from minicomputers. So Harris has had to turn to State-owned Bull, the parent company of Cii Honeywell Bull, in which Honeywell retains only a 20% share.

Harris, which earned 30% of its total electronics turnover of \$1.3 billion last year from information technology, has now been operating in France for five years.

It expects its French turnover from computer activities, which totalled 20 million francs (£1.8 million) in 1982, will rise by over 20% over the next five years.

Semiconductors represented 11% of world turnover for the group and, in spite of a drop in sales last year, Harris expects an annual increase of 33%.

This explains Harris' readiness to introduce new products at the factory in Nantes, on the French Atlantic coast, which it operates with Matra.

September, Inmos Corp nominates three new VPs: John Heightley (memory products), Fred Gauding (technology) and Ralph Bohannon (production), all 1978 recruits. Douglas Rankin, who had been with TI for 16 years and gets the marketing VP post, is the sole newcomer at top level.

October. A 33 acre site at Daffy, Newport, is to become the site of the £25m plant.

February 1981. Inmos Corp announces details of its 64K DRAM at the International Solid State Conference in New York.

March, April, May. Inmos names 40 agents, 66 distributors and plans the opening of five sales offices. The agents include Matsushita Electric Trading in Japan.

June. NBB discloses that its allocation of \$29.8m of its allocation to Inmos halves price of its 16K RAMs.

July. Lawrence H. Goldstein, senior engineer at Inmos Corp receives the \$1,000 Browder Thompson award from the IEEE.

October. Of Dr Schroeder's ex-Mostek group, three - Ward Parkinson, Doug Pittman and Dennis Wilson - are offered a two-year consultancy contract by Mostek and leave Inmos/Dallas to set up Micron Technology in Idaho. Inmos Corp calls the departure "inexplicable". NBB approaches Ferranti, in which it holds a 50% stake, with a request

for a meeting.

May. Inmos Corp claims to be

quiet.

Continued on page 9

Optical disc in mass production next year

by Jack Gee

THOMSON-BRANDT is to begin mass production of its digital optical disc, the Gigadisc, next year in the hope of achieving worldwide sales of 10,000 units in 1985, the French State-owned company said in Paris.

The announcement followed the presentation of a prototype of the Thomson unit, which is to be manufactured in partnership with Xerox, at the Congressional Library in Washington where the two companies are bidding for a massive order.

Under an agreement with Xerox, Thomson will manufacture the Gigadisc in France for the European market, and Xerox will make and sell it in the US.

Unit retail prices will be in the range of 70,000 to 100,000 francs and discs, which cannot be erased, will cost between 150 and 250 francs.

Thomson officials say the French firm is confident that after 12 years of research and development, it can make a major breakthrough with Gigadisc.

SHOCK . . . "Everything the ADO programming environment is supposed to be but isn't".

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Which firm has Picked the winner?

by Claire Gooding

TWO major backers of the Pick operating system, formerly partners, are now going into competition. They are Neil Ratcliffe's IDM, based in Doncaster, and Nick Drescher's UCL, in London.

UCL is hacking Epick, a Pick lookalike which sits on top of the popular CP/M operating system. Epick was developed by UCL to bring the power of the mini software down to the micro.

CP/M commands and Wordstar word processing can be used from inside Epick, which is fully compatible with the "true Pick" — Dick Pick's own system — on the larger machines.

It can run the library of applications for the Ultimate machine, a Honeywell and DEC hardware-based system running under Pick which UCL distributes in the UK for the Ultimate Corporation.

Although UCL envisages Epick as an end-user tool within an Ultimate data processing shop, it can also be bought as a standalone system based on the Cifer terminal. Standard applications such as Micromodeler will run under the

CP/M and Pick combination, opening up a potentially huge market for UCL.

Drescher argues that a Pick system has what is needed to support a relational data structure. "The micro market is getting very sophisticated — users are beginning to demand database facilities," he said.

Epick's implementor Tim Roberts said: "If Pick does a version himself he will do it better, but he hasn't and people are in a hurry to get Pick into micros."

But IDM managing director Neil Ratcliffe says he is not impressed with Epick, which he claims is no competition for his IBM PC version, Revelation. This is being distributed in the UK for Cusins of California by IDM.

Ratcliffe, like Drescher, sees Pick on the verge of a big breakthrough, but he thinks this will be spearheaded by Revelation and the long-rumoured micro version from Pick's own computer works.

Revelation supports its own enquiry language and applications generator called R/Design.



DRESCHER... Users are beginning to demand database facilities.



RATCLIFFE... Epick is no competition for Revelation, he claims.

Although UCL envisages Epick as an end-user tool within an Ultimate data processing shop, it can also be bought as a standalone system based on the Cifer terminal. Standard applications such as Micromodeler will run under the

£100,000 plan to stop piracy

A £100,000 software protecting project is under discussion between the British Technology Group, the National Physical Laboratory and a number of private firms.

The plan is for a joint research team to look at methods of combating the growing problem of piracy. Half of the money would come from the government, half from industry. Up to about 20 companies could be invited to take part.

Derek Grover, chairman of the British Computer Society's software protection group, said that they wanted to centre on the concept of "the tamper-proof module," which was being seen as the only effective means of achieving security of programs.

Organisations could be asked to pay a £5,000 annual fee for a report on the findings of the group.

"But we have to be open-ended about the scheme at present because we don't know what the software will be."

John Cartwright, ICL's patent services manager, told the BCS specialist group that injured parties should consider asking to be allowed to take a computer into court.



GROVER... Focusing on the "tamper-proof module".

"In the US screen displays have been used as a part of evidence and you should consider doing that here too. I see no reason why it should not succeed," he said.

Copyright law stated that ideas were not protected — yet there was plenty of case law to show that literary plots and original ideas had been considered by judges as products which had been copied and were covered by copyright. "In the US, programs in almost every kind of medium have been held to be copyrightable," he said.

But in this country so far most cases had been limited to an injunction. So far no case had gone to appeal.

Olivetti markets Forth for M20 micro users

by Philip Hunter

SCIENTIFIC users of Olivetti's M20 micro who are fed up with writing in Basic can now program in a language designed especially for their applications. British Olivetti is marketing in the UK an advanced version of the language Forth developed by small Derby-based company Tower Associates.

The language, called Olivetti's Forth, is tailored for the Z8001-based M20 from the original standard Forth developed at the US.

Software File is compiled by George Black

IBM backs coloured book protocols

by Donald Kennett

IBM is backing UK users' efforts to implement interim open systems standards. It has awarded a £25,000 contract to Salford University to implement the "coloured book" or "rainbow book" high-level networking protocol developed in the UK to run under the VMCMS operating system on its machines.

The package will be marketed by Salford University Industrial Centre.

The protocols are designed to enable applications running on different manufacturers' machines and under different operating systems to interwork with each other. They have been specified by the Industry Department as a required part of any tenders to supply computer systems to UK

universities and research council establishments and have been recommended as interim standards.

IBM has already announced its backing for the protocols. Discussions are being held with other manufacturers including GEC, Control Data and Harris. Similar software is available for Digital Equipment machines, but not supported by DEC, according to Dr John Larmouth who heads the Salford development team.

The protocols are implemented in a machine-independent package, written in Fortran 77, which contains some machine-dependent parts. It is these parts that are being implemented for VMCMS-based systems under the contract.

There is also an implementation to run under MVS on larger IBM

systems, but this is not supported by IBM, Larmouth said.

Work on open systems protocols has been going on for several years and it is expected to be several more before a complete set is available from the International Standards Organisation. Meanwhile user groups and manufacturers have been developing interim and proprietary protocols as well as contributing standards committee work.

Salford has already received over £70,000 for its work on developing and implementing networking software. Another £25,000 has gone to Edinburgh, Newcastle and Durham Universities for implementations on IBM systems. The money came from the Department of Education and Science university computer board and from the Science and Engineering Research Council.

CP/M gives new life to old minis

DATA General hardware users are being offered access to the galaxy of CP/M operating system-based applications programme.

The system has been put together by Ciba Computer Services of Whitleydale, Surrey, a six-strong team operating in the Data General field. The solution, called Mirage, is being distributed by Ciba for Custom Systems Inc (CSI) of Minneapolis, a system house and DG OEM. Systems software

was developed for CSI by Rational Data Systems of New York.

The incompatibility of Digital Research's best-selling micro operating systems, the CP/M group, with minicomputers, has in general meant that many mini users were locked out from applications software which they were keen to have.

The range of CP/M software, greater than that of business applications for minis, is unavailable.

Ciba's director David Cox said they had packaged two personal computers on to a standard DG size card.

Each Mirage user had a 280A-chip micro giving 64K memory and a choice of hard or floppy disc drives and printers.

A single-key depression would take the user from DG software into the CP/M program environment and take Nova and Eclipse users into VisiCalc or WordStar.

DBMs can learn new words from the user

by Philip Hunter

MATHEMATICA is branching out into artificial intelligence systems. The American author of the Rama-11 database manager has extended the software with an English processor which learns words from its users.

The processor has a vocabulary of some 3,800 basic English-language terms which is currently being enriched by Mathematica's own systems team to 4,500.

But when it encounters a word it doesn't understand it tells the user and gets him to explain it. It then records and files the word for future reference.

The general dictionary is linked to two other Rama word files, the RamaMaster flexible data dictionary and the file-specific dictionary for compiling technical and personal expressions.

Bernard Finzi, Mathematica's senior vice-president in the US, said the firm would not seek the patent the term "English" as there will be able to fit the needs of the diverse companies and groups in this industry," he said.

MICRO NEWS

Harris opts for Slough as its Euro base

HARRIS Semiconductor has picked its UK subsidiary, Harris Systems in Slough, as the base for its European expansion. Harris Systems will serve as the headquarters and trading centre for all European markets.

The Slough-based operation will be a joint company set up between Harris and its French partner Mats-Harris Semiconducteur, called Harris/MHS, and will be headed by senior vice-president Ralph Kaplan.

KAPLAN... Wants growth.

operation will bring together Harris' custom ICs and its standard analogue, bipolar and CMOS lines.

To speed up things for its European customers, Harris and MHS have started work on a joint management information system, to be located on a mainframe of MHS's Nantes site.

Online terminals will link all European sales centres with Slough, Nantes and the US production plant in Florida.

Harris plans to double European sales of its-produced Harris components and French-built MHS circuits by the end of 1984. The

solution to a low-tech problem. Personal computer networks will be crucial to the spread of local area networks, but performance will not, according to a report* from the US.

The report differentiates between what it calls personal computer networks, with data rates less than three megabits a second, and high-performance systems such as Xerox's Ethernet and its broadband rivals, which operate at 10Mbps.

All the moves by the Ethernet partners to reduce the cost per device of using their networks will be paralleled by personal computer network makers who will be working at a much lower price level all along, according to the report's authors Strategic Inc. The result will be that hardware costs negligible on personal computer networks.

The numbers of personal computer networks installed had already reached 12,000 by last July, the report says, whereas high-performance network installations had only reached 800 last month.

Included in the definition of personal computer network were the products of six dominant suppliers which ranged in capability from Televideo's eight-bit and 16-bit service processors, each of which support a maximum of 16 workstations, to Datapoint's Arcnet which can support hundreds of terminals and processors.

The issue of market share is avoided, but Corvus is shown as top by number of installations with 3,000 Omninets capable of linking 64 workstations at 1Mbps plus 5,000 Constellation multiplexers capable of linking eight workstations at 250Kbps.

Number two is Datapoint with 5,500 2.5Mbps Arcnets, followed some way behind by Televideo.

From the UK, Acorn's Econet and Rca's Milgo's Planet get honourable mentions.

*Personnel Computer LANs, \$970 from IPI, Norder Ringvei 201, 2600 Gjøteng, Copenhagen, Denmark. Tel: 010 452 63 20 44.



KILLEN... Invisible networks.

Why software is crucial to LANs

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Will programs be a hit?

by Andrew Thomas

LAST week saw the release of

of</

JENNIFER d'ABO'S SUNDAYTIMES

Jennifer Hammond-Maude started her career as Peter Cadbury's secretary. She then opened a grocery shop - Rob's Food Market. Today, as Jennifer d'Abo, she runs Ryman's.



This year we've been spending most of our weekends at the flat in London...that is when we've not been abroad. It's been a terrible year for travelling.

I hate flying with a passionate loathing, my entire inside simply churns at the idea, but one just has to live with it.

In January we went round the world and since then I've been to Milan, Paris, Stockholm and Copenhagen. But when I'm at home my main occupations on a Sunday are reading and pottering around talking to the hordes of plants in the flat. Ideally I like to wake up as late as possible because I'm a very bad sleeper. Then I make a cup...no that's too refined... a mug of instant coffee and stay in bed reading the papers until as near lunchtime as I dare.

My husband, Robin, or one of the children generally go out to pick up the papers, but I like to get hold of them before Robin because he divides them up and leaves a trail of bits wherever he goes. They always look like a dog's dinner after he's finished with them.

If the children are about I'll drag myself up around 11.00 and start cooking. The kitchen is a very therapeutic place for me as I can mess about in there just as I like. But if we haven't got the children, we'll go off to a restaurant for lunch.

I hardly read the papers during the week, which leaves me appallingly ignorant of what's going on in the world, but I like The Sunday Times business section very much and always read it from cover to cover. I'm a great fan of the person who writes the leader in the business section...I do wish he were in Geoffrey Howe's job. Just when everyone else is sitting up saying the recession is finished, he

comes along and points out in a very nice way that it isn't.

Prufrock is good too, and I find the stories in the business section are much more informative and descriptive than the daily news in the financial press.

I also like the way they find some small business and write it up...it's very encouraging. When you start a business, there's so much to put you off, it's nice to read about something that goes right for a change. And people take note of what they read. There was a story once about a chap making furniture who was in difficulty because he'd been persuaded to move into a building too large for his business and we rang up to see if we could get together with him in some way. But he'd already had about 20 calls that Sunday morning from people offering to help or buy him out. The news in brief pieces and the bits of gossip on the lines of "watch this company" are also quite amusing.

One of the great things about Sunday is that it's the only day when the phones don't ring. I'm always nervous when they do as I think there may be something wrong with one of the children, so I associate Sunday with that freedom from the telephone and the relaxation I feel as a result.

In the afternoon I'm quite happy to curl up and read a book, or sometimes we go off to a video place in the Fulham Road that Robin's crazy about and come back to watch a new cassette. Otherwise we'll go for a walk.

There is also The Sunday Times crossword. Robin reads the whole paper and keeps it for two or three days, but I generally flip through the main news section and the crossword, which we attempt during the day as a joint effort. It's the only part of the review

that I turn to. When I was married to Peter Cadbury he was absolutely marvellous and would let me have a go at it before polishing it off himself. But I have got out of practice in the last seven years.

Like the rest of the day, the evening is, if all goes well, very quiet. After making supper, I'll go to bed early and read a book. Or perhaps see if I can finish off that crossword.

In a recent survey by the New Business Research Consortium, several interesting facts emerged:

◆ The Sunday Times is read by more businessmen than any other newspaper.

◆ The Sunday Times is the only quality Sunday to have increased its businessmen's readership since 1980.

◆ The Sunday Times has market leadership in most of the important occupational areas, including: marketing, 43.5%; computing, 32.5%; finance and accounting, 38.5%.

◆ The Sunday Times has more readers in all the following categories: top income bracket, 51%; 2-car families, 36%; credit card ownership, 35%; value of shares £10,000+, 53%.

Almost every indicator showed The Sunday Times to be the top paper for business men and women.

For more information about display advertising, phone Mike Ruda, Advertisement Director, Times

SUNDAY TIMES MAGAZINE Newspapers 01-837 1234.

SUNDAY TIMES business news

review

THE SUNDAY TIMES
Sack Foot

More businessmen read The Sunday Times than any other newspaper.



THE SUNDAY TIMES

The accountant who sees red in grey images

THE audacity of the computer is that it recognises no stereotypes, respects no entrenched images, allows no dusty reverence for tradition.

The public image of accountants casts them as dull, grey people whose minds move in columns, who balance their laundry lists and audit their mistakes.

Not so! The accountancy profession, seen by many as one of the last bastions of "staidism", is changing fast. And one of the elements of this change is the invasion of the computer into the hallowed hush of the auditor.

Rod Perry, computer audit partner of Coopers & Lybrand, sees red every time anyone levels the "boring grey men" accusation at his profession.

"It's not like that," he stornis. "This image of the accountant as a man with a funny walk, a John Cleese, is absolutely absurd."

"There are some very able people in the profession — very able, very flexible, very imaginative, quite radical in fact. Yet all of those words that you would never normally hear associated with accountancy."

Perry believes vehemently in computer auditing, and he argues most persuasively for increasing involvement on the part of all accountants in this dynamic area. "Too many people see the audit as something static, that an opinion is an absolute thing — 'I've given my opinion on the accounts and that's that, I don't need to look any further' — that's nonsense."

"The world is changing all the time and the client is moving to new techniques, using computers more and more, not only for accounting systems, but extending to the flow of all information within the organisation. The audit has to change to. And if we don't adapt we'll become less and less relevant."

It's not just accountants he's talking to. He claims that finance directors, lawyers, academics and data processing people should also get involved. "It's important for all those sort of people to understand, but particularly the DP people. If you're running a DP department you might need to know what controls are desirable and to what extent you should be audited."

Primarily of course the influence of computer auditing techniques is felt by two main groups — the auditors and the clients.

For the auditor the use of computer systems means that he can get much greater coverage of the data. You can examine much more information.

Perry paints a vivid picture. "Imagine a big company and all of the invoices for the whole year in lever arch files. They're stretching across the walls — you've got wall to wall files full of invoices. Then

it's only to see that computers are lighting up into the life of the world's auditors. But what about the clients?"

The benefit for the client is that he restrains the inevitable cost of

IT'S 10 YEARS AGO

FROM COMPUTER WEEKLY OF JUNE 7, 1973: Control Data Corp entered the floppy disc market with the launch of the 9400 flexible disc drive... Former Labour Minister of State at the Foreign Office, Lord Chalfont was appointed to the board of IBM UK Holdings... Pentac Corp of California named former executive vice-president of MDS, Ryal Poppa, as president... A base for LRC operations was established in Surrey by US minicomputer manufacturer Modular Computer Systems...

I HAVE THIS IDEA THAT THE ONLY...

by Don

LiveWare File

...EXCITEMENT LEFT IN THIS ELECTION...

IS WHETHER THE ITN VICE...

WILL GIVE BETTER GRAPHICS THAN THE BEEB'S SET-UP!

...IS THE DAY...

WORKPLACE

Five seconds and you've got a code

"WHAT is my post code?" I asked Gururukh Singh, co-founder of the small computer services company CAM (Centre for Analysis and Modelling), based in Waterloo.

Singh fumbled with a terminal, and came up in about five seconds with the answer — pretty impressive when you consider that the computer had to search a database of 23 million addresses.

CAM deals in refined data, and the post code application is typical of what this £500,000 company does.

Businessmen can save money by finding out from CAM the post codes of clients. The Post Office gives discounts to companies that send letters bearing the correct postcode. For a million letters the saving can be £37,500.

CAM specialises in financial modelling, and statistical analysis of large volumes of data. Most of its revenue is from consultancy for government departments, but the company has now launched a subsidiary, Pinpoint, to attack the commercial market.

The company's biggest exercise in data crunching was from the Department of the Environment. This was the analysis of informa-

tion supplied by a million homes in the National Dwelling and Housing Survey carried out in 1978.

CAM is still marketing statistical tables from this survey, in collaboration with the DoE and the Welsh Office. The DoE has direct access to the information by linking up CAM's Digital Equipment Vax computer, to perform more detailed analysis.

"It is not our job to analyse and draw conclusions," sighs Singh.

The survey gleaned information not taken by the more recent 1981 census. The housing survey gives more details of each home, and of the occupants, but unlike the census does not provide country of birth.

CAM's greatest success, notable for so small a company, was in winning the contract to perform the government's controversial rate calculations. The formula was changed in 1981 to the block grant system by which the rate support is allocated according to how much each council needs to spend, based on a weighting of "relevant" factors.

The contract for the rate support contract went by public tender to two US companies,



SINGH... "Not our job to analyse and draw conclusions".

Geisco and Comshare, in 1980. The system did not prove totally successful — last year the government had to step in with an extra £25 million for London to save Tory councils from face-reddening rate rises.

So this year the DoE deemed that the contract might as well go to a British company, and picked CAM.

Because of its unique access to databases of national geographic, social and economic data, the company is well placed to help with market analysis and selection of sales outlets. CAM recently helped Marks & Spencer pick the best site for a new store.

And the company offers a poster targeting system, which suggests where an advertiser should site a poster for the best impact. CAM developed this service by extracting data, including the position of drinking hosteries and other public places, likely to attract poster gazers, from several regionally-based databases.

Another lucrative contract came from the City of Westminster to digitise existing maps of the sewer network. This speeds up the process of checking whether a

sewer is safe before maintenance men descend into its bowels. It also makes it easier to examine the state of the sewers round a proposed development site for a big new building.

Singh is not one to vaunt his wares, and until this year shied away from the stage. "I've never sought publicity," he laments.

But this, he admits, is not the

IBM sites make false training economies

MANY IBM mainframe sites are making false economies of training of development and test staff. The result is high salaries and recruitment costs, and fast staff turnover.

This is one conclusion of a survey, *Applications Development in Practice*. Another finding is that in 33 sites surveyed it has been an average application backlog of 147 man years. This means priority projects are unlikely to start until 1987 when they're probably defunct.

And talking of man years, 3 are thrown away each year in projects. This is worth £300,000 a year if you cost a man at £250 including salary, office space and machine time.

What the survey fails to say is how much money would be saved if these unwanted projects were completed. Or how much it would cost to employ enough systems designers to avoid the false trails.

Recruitment and training is a way to cut applications backlog. DP managers estimate that recruitment costs them over £100,000 a year in agency fees and advertising expenses, but they expect to get less than £250 per person per year on training. This limits the number of suitably trained people and means that as demand for skills increases, their cost will rise.

The report says: "User resistance to spending very much on training will contribute little to expanding the supply of qualified personnel."

The survey looked at one of the ways of reducing backlogs. Only 11 of the sites use software house development staff to support in-house development. Ten use contract staff, accounting for 10% of development effort. Six sites use software houses, which represents 11% of their development effort.

Getting end users to develop their own applications is another way to reduce backlog.

DP managers estimated that 30% of developments could potentially be done by end users, but they did not seem keen on the idea. The report says: "Despite recognising the potential scope of end user computing, respondents were not overly enthusiastic about it — perhaps as a consequence of professional territorialism."

Structured methods were ranked last out of seven possible methods of improving development productivity, and one manager dismissed them as best suited only for staff of "programmers".

Applications Development in Practice, Xerox Technology Transfer Ltd, Xerox House, King Street, Maidenhead SL6 1ES.

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FIFTEEN
FIFTY
FORTY

SEVENTY

GIVEN the fact that SEVENTY
is an even number, can you work
out the addition sum hidden in
this alphametic. See page 71
for answer.

GU

PUZZLER

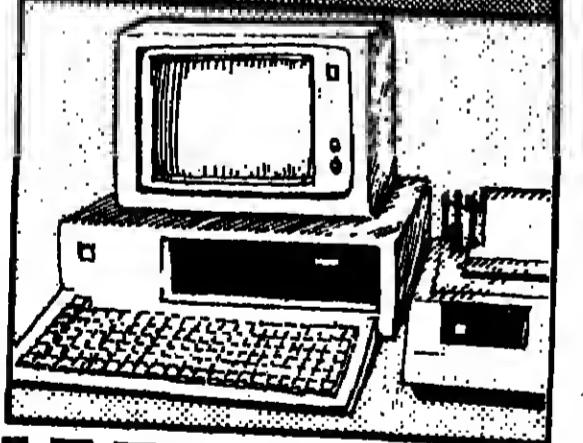
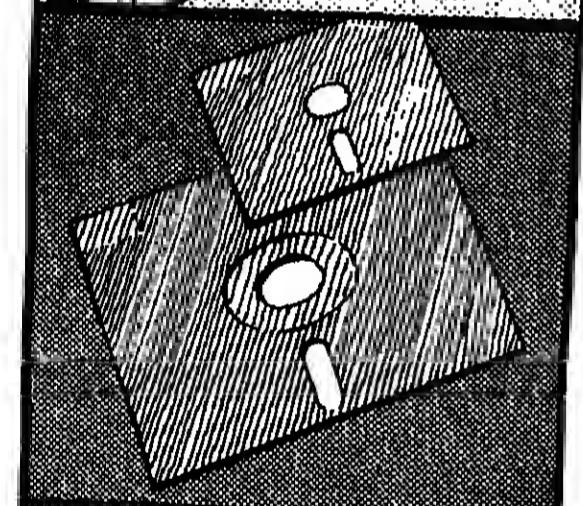
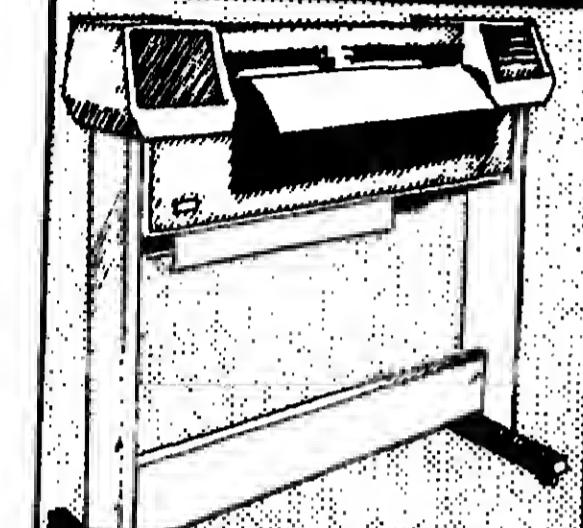
SEVENTY

The North of England's own computer systems, peripherals and software exhibition...

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Belle Vue, Manchester.
June 21-23, 1983.

• Belle Vue Manchester



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Opening times are: Tuesday June 21, 10am-6pm
Wednesday June 22, 10am-6pm
Thursday June 23, 10am-4.30pm

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Compec North is a Computer Weekly exhibition in association with Systems International, Computer Talk, Software and Practical Computing, and is organised by Reed Exhibitions, all members of Business Press International Ltd.

Please send FREE advance registration tickets for
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COMPUTASTARS SECOND REGIONAL HEAT

Commercial Union tops men's teams



Centre File's Horace White prepares and lands in the long jump.

WELL, we didn't come last, but we had a damned good try. Computer Weekly's very own Computastars team did little to dispel the commonly-held beliefs about journalists' physical prowess. But enough of abject failure: on with the show.

Something was seriously wrong with the weather. The sun was shining and a warm breeze caressed the Computastars penitents at Enfield on Sunday as the 25 male and 10 female teams prepared to do battle. And what better to start the proceedings on a hot day than heaving a heavy medicine ball about?

The first of a string of good showings from Bank of America number one Vernon Turner helped his team move an early lead with Commercial Union. Bank of America's women's team matched its male counterpart's performance, pulling out a six-point lead over second-placed Commercial Union.

Early optimism in the Computer Weekly camp (equal third from last) was dashed in the hockey, beaten Commercial Union and Centre File into joint second place. Sandra Upshall of Barclays International put up the best women's individual performance, with Tony Jones of Codex

leading the men. In the Inland Revenue team, Legal & General's women started a run of four first places in the hockey, beating Commercial Union and Centre File into joint second place. Sandra Upshall of Barclays International put up the best women's individual performance, with Tony Jones of Codex

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In the standing long jump a

splendid effort from Barclays International 1 left no doubt about its standing orders.

The same weak attempt at humour could also be applied to Bank of America

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wooed the individual event.

A double first for Legal & General's women's team and number one

Anne Bragg saw its lead over Commercial Union extended.

Then it was the turn of the team sprints - the last event before lunch. A three-way tie saw British Aerospace 2, Centre File 1 and first time entrant Hartley Cooper sharing 45 points each. This position was mirrored in the individual scores, as Steve Skelton, Stuart Aylott and Horace White also tied for first place.

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Panama Office Systems, the new British company which is developing the "Personal Typing Centre" to be launched later this year, has announced its senior management team. Left to right are: Alan Ogilvie, director of development and engineering; Michael Kennedy, director of marketing; Terry Cooke-Davis, managing director; and (seated) Robin Smith, director of finance, who is shown demonstrating the Personal Typing Centre. PTC combines the functions of a typewriter and word processor and will, according to an optimistic Cooke-Davis, "mark the revival of the British typewriter industry."

■ HAL Computers has appointed Bob Spanton as technical support manager. He was previously in a similar job with Eaton Semiconductor Equipment.

■ Ferranti GTE, the high-technology telecommunications company, has appointed Mike Almond as manufacturing director. He was formerly with the management consultancy Collinson Grant Consultants.

■ Anderson Jacobson has formed a business computer division and appointed Lloyd Collins formerly with Rain, as Ailie sales manager. Ailie is Anderson Jacobson's portable 16-bit microcomputer.

■ Megabyte, the Leeds-based computer supplier and a subsidiary of the Associated British Engineering Group, has announced the following board appointments: Tony Burgin as managing director, Mark Whittle as financial director, Chris Simpson as software director and David Sanders as sales director. Burgin was previously the company's sales manager, Whittle has been promoted from financial controller. Simpson was previously software manager, and Sanders joined the company a year ago as special accounts executive.

■ Prime Computer has appointed Richard Williams as vice-president Europe, Middle East and Africa Marketing Operations. He joins Prime after eleven years as an international senior executive with IBM.

■ Burroughs Machines has appointed Major General William Allen (above) as director of training at the company's new residential training college at Milton Keynes. The £10 million college is in the final stages of construction and will open in early 1984. Allen is currently director general of Army Transport and Movement. Previous appointments include that of Assistant Commandant at the Royal Academy of Sandhurst, where he was responsible for the overall administrative control and training function for the students at the Academy.

■ Koy Clayton, (above) has been appointed manager for Safe Computing's Micro-SaPeS production control system, controlling all sales, dealer training and support for the product in the UK. Based in Leicester, she was formerly part of the Micro-SaPeS support team and is experienced in both programming and production management. Former companies include Serck Controls, Unisys Forward Trust and KRS Computer Services.

■ Micom-Borer has appointed a new sales team for its recently opened office in Knutsford, Cheshire. The team is headed by Bernard Durkan, Northern region sales manager. Durkan joined the company from the independent software house IPS. David Thompson has been appointed a sales executive to cover the North East of England and Scotland. He joins Micom-Borer from Burroughs where he spent four years as a sales executive. Brian Lee has been appointed sales executive to cover the Midlands. He joins Case.

■ Brian Cudby has been appointed general manager of Ducca Bransom Contract Services, a new company set up within the Ducca Bransom software services group to supply contract support staff principally for banking and financial computing projects — through a "Top 100" register. The company is head-quartered in a new London office opened by Ducca Bransom at Wilec House, 828 City Road, EC1Y 2BJ. Cudby joins Duncan Bransom from BIS Software Ltd, where he was operations director.

■ Dr Paul Auton (above) will take over as managing director of Cambridge Consultants in July. For the past six years he has been deputy managing director and, for most of that period, has been responsible for the operation of CCL's contract development business and the company's personnel policies. Before joining Cambridge Consultants in 1969, he worked on lasers and semiconductor devices at the Marconi Research Laboratories.

DIARY

JUNE 13

Tomorrow's staff — where are they now? IDPM Norfolk branch: Castle Hotel, Castle Meadow, Norwich. 7.30.

JUNE 15

SERC's software technology initiative. BCS Software Engineering Group, Chemistry Theatre, Birkbeck College, Malet Street, London. 10.30. Admission: BCS members £1, non-members £2.

JUNE 16

Visit to Hewlett-Packard, Hertfordshire. BCS West Herts branch. Details from Peter Greatrex on 01-623 5222.

JUNE 22

The office of the future. BCS Sussex branch, King and Queen Street, Brighton. 10.30. Details from Peter Walmsley, BCS headquarters.

CONFERENCES

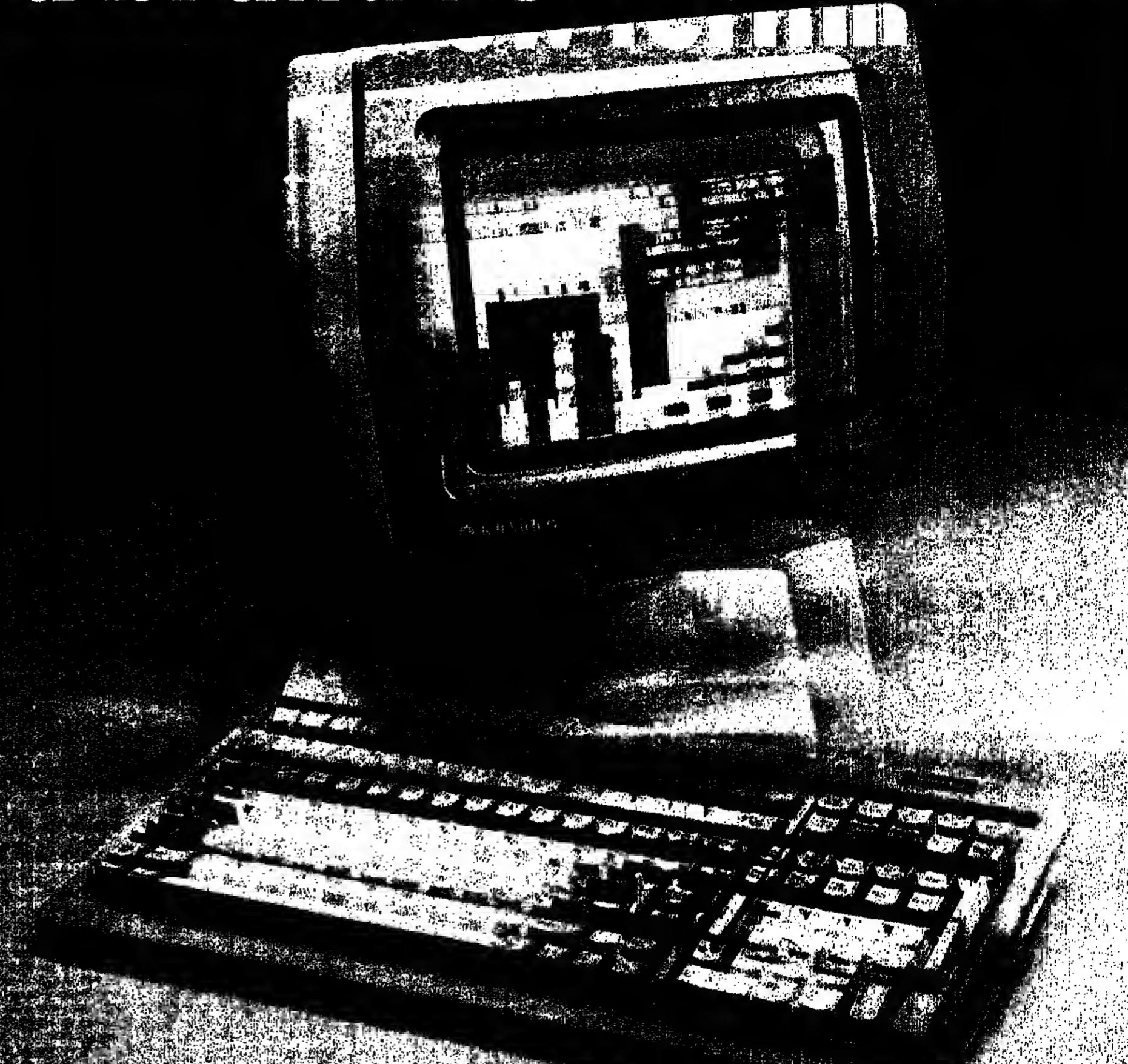
■ BIRASDALE

Computer Systems is expanding its range of courses on "Unix" and "C". The following two courses are now being offered. Unix for Managers — this one-day course is designed to give an understanding of the Unix software system and the developments both in hardware and software. "C" Programming Standards is a two-day course which supplements the company's three day course on the same subject. This advanced course deals with the standards which should be adopted when producing programs in "C" together with the program development facilities offered by Unix. Course dates: Unix for Managers: June 23, July 21 and September 22. "C" Programming Standards: June 20-21 and September 19-20. Details: 01-825 6661/2.

■ THE newly-formed independent Association of Authorized Digital Computer Distributors (IDEC) is planning a conference for October this year. IDEC currently meets each month for members to discuss subjects of mutual interest in their dealings with Digital. The conference is seen as a focus for major issues of the present and future. Digital will be invited to take part in an exchange of ideas at the conference, which is seen as a potentially important milestone in relations between IDEC members and the company.

On June 17 Dr. Eric Haworth, IDEC's chairman, will be visiting America for talks with Digital's authorised distributors and Digital itself, and he will be inviting guest speakers from the US to the conference. Details on IDEC from Dr. Haworth on (061) 246 7100.

Familiarity breeds a brand new terminal.



TeleVideo have combined the best innovations in technology, design and quality manufacturing that has gone into their CRT's over the last four years to bring you the new 924.

Its smart tilt and swivel housing provides extra display features including full-screen editing, character and block graphics, definable scrolling regions for multiple window operation, plus 32 character-by-character visual attributes.

32 programmable, non-volatile function keys turn often used instructions into simple one-button commands. The low-profile keyboard fits your fingers naturally.

Back in 1980, when you expect, the 924 and the less powerful 918 mark a familiar story from TeleVideo — the best name in computer terminals.

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The sponsors and organisers of this event are all members of Business Press International Ltd.

Some see it as an opportunity, some as a threat. But viewdata will have an increasing impact, says Barry Ashdown

VIEWDATA with its attractive and inexpensive terminals, easy communications and simple user protocols is now becoming well established. In the past two years, almost 150 private viewdata systems have been installed in the UK and increasingly these are being integrated into normal data processing.

The original viewdata concept is typified by Prestel, the British public viewdata service. The viewdata frames are stored on disc in their final display format and each allows the user to branch to 10 other frames by making a simple menu selection.

However, the static database is not applicable to transaction oriented business applications. Here real time viewdata is required so that viewdata frames can be made up dynamically against user requests. This may be achieved by reformatting VDU screens from 80 character monochrome to 40 character colour or by accessing DP files and storing the results in viewdata frame masks.

The reality is that most business applications would use both static and dynamic frames. The static frames will be used for pointing down to the chosen application, for general instructions, notice boards etc. The dynamic frames will then be created in response to commands from the user.

These commands are likely to take the form of completing fields within a data collection frame.

A number of other features go to make up a viewdata system: Data collection where viewdata is being used to create a batch transaction file for overnight processing; the mailbox feature which allows the system operator or individual user to send messages to one or more other users (the mailbox on some systems is so good that it competes favourably against some free standing electronic mail products); electronic notice boards, notepads and diary systems.

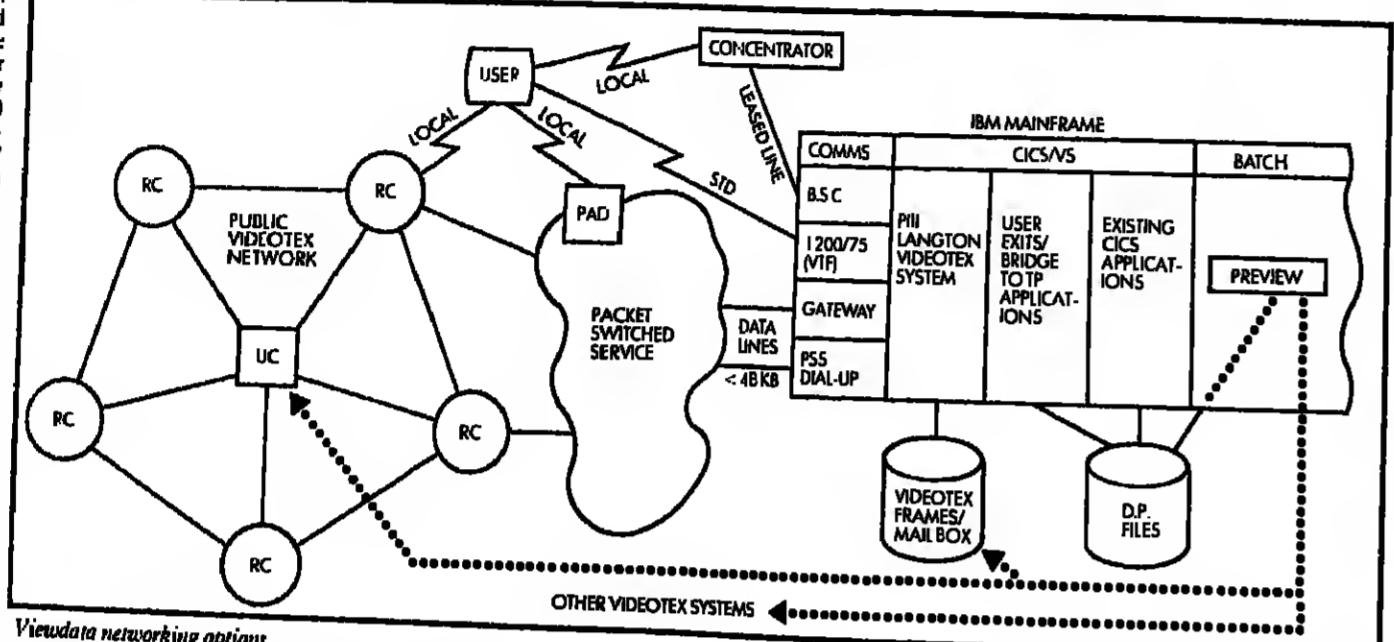
Powerful system management functions are provided including security control, system performance and usage statistics. These sorts of features are now standard on most viewdata systems.

But for all its advanced features, viewdata is really all about communications. The two options most often considered are direct dial and Prestel Gateway, but a number of other options are available.

Direct Dial uses ordinary PSTN speech lines to connect either directly to the viewdata system or via local or remote concentrators. The use of remote concentrators will be determined by any existing network, the geographic coverage required and expected traffic flows. Each concentrator could support up to 32 viewdata ports and would be connected to the viewdata system by leased line.

Another current option is to use the Packet Switched Service (PSS). Each PAD (Packet Assembler/Disassembler) on the network already supports the connection of viewdata terminals at 1200/75 bps. As part of the PAD log-on process

Viewdata—the liberator that does away with computer mystique?



Viewdata networking options.

the user selects the mode of operation. Usually this would be to define an enter key which is used to terminate each packet and send it through the network.

It is also possible to work in character mode (very inefficient) or with a timer which sends off the packet when no key strokes have been detected for a defined interval.

Looking to the future we can see cut sizeable programs in support of each frame that each user accesses then, clearly, CPU power becomes an important factor in the argument. The mainframe has plenty of computer power and is the machine on which the data files are held.

Another indicator leaning towards the mainframe approach is that transaction based systems require a reasonable CPU to support them.

As soon as it is necessary to execute as an exciting delivery mechanism for viewdata. The enormous bandwidth of cable means that alpha photographic television quality pictures (Picture Prestel) can be delivered almost instantly, compared with the several minutes it takes to send the same information through the telephone system. Links between viewdata and other telecommunications networks like telex and teletex can also be expected.

The Prestel Gateway service which started in 1982 has opened up some interesting networking possibilities. Prestel allows local call access to over 60% of businesses and homes in the UK and this is planned to increase to 90% over the next few years.

By connecting a private viewdata system into this network it is possible to avoid the high STD telephone charges incurred by out-

As the capacity of one minicom-

puter is exceeded there is a need for additional hardware with problems of networking and maintaining concurrency of the databases.

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Boris Sedacca meets somebody who could be Prestel's saviour

The man who wants to get 100,000 new users on to Prestel

WHEN British Telecom launched Prestel as a domestic viewdata service, the aim was to make it simple enough for anyone to use.

But despite this obvious advantage, the total Prestel package was marketed as unattractive to domestic users by BT that, over the years, the service had come to be regarded as something of a white elephant.

British Telecom's impending privatisation and the liberalisation of telecommunications has forced BT to become more aggressive in getting more users on to the service, says Owen Amdahl, director of Owen Amdahl's office.

HEASE...
"Eventually I
convinced"

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The high turnover of Information Providers struggling to make their Prestel Information service pay from a small number of subscribers began to worry BT. After four years of operation there were still only 20,000 users on Prestel.

So when a plan was presented to BT to get 100,000 new users over the next three years, its first reaction was sceptical.

"When I approached Richard Hooper of Prestel and said 'How would you like to get 100,000 new users on to Prestel', his reply was 'Go on, pull the other one'. But I eventually convinced him my idea was sound," says Richard Hease, managing director of Micronet 800.

Micronet 800 allows microcomputer users to load software into their machines by logging on to Prestel.

Hease's brainchild came about when East Midland Allied Press set up its computer publishing division. The company had a subsidiary called Telesmap which provided Prestel information on gondolas and motor-cycling.

EMAP directors told Hease to investigate Telesmap and to decide whether to close it down or make it

properly."

According to Dr Gene Amdahl, the basic Trilogy machine will contain about 30 of the Trilogy chips, implemented in emitter coupled logic and water-cooled. The move to water cooling marks a major technical shift for Dr Amdahl, whose name has long been associated with the generation of air-cooled Amdahl Corp (and Fujitsu) machines. Before that he was the architect of IBM's 360 range.

Hease called in Silicon to do the job. "We had previously used a number of small software houses, but it became obvious we needed to get professionals in because timetables were slipping and documentation was not being produced. It's worth paying the extra money to get the job done properly."

If Micronet succeeds in its ambitious aim to get 100,000 users by March, 1986, it will have gone a long way to becoming the saviour of Prestel, despite British Telecom

work. "At the same time I was looking at telosoftware as an alternative software publishing medium to conventional magazines, and also at problems of accessing information from databases.

The first problem we had to crack was to get Prestel's co-operation. The second problem was to make access cheap enough for users. We ditched the other Telesmap activities to concentrate on database access."

Some of Micronet's funding comes from a Department of Industry grant of £250,000 over two years, and also from Prestel in the form of resources worth £500,000 for technical development personnel for loading telosoftware, and for pages on Prestel.

Micronet's revenues will come from three sources: subscriptions, software sales, and advertising. A subscription costs the user £1 a week for a minimum of one year, billed quarterly by British Telecom.

For this he gets free access to the Micronet database and a range of free software comprising about 100 programmes. Educational establishments are encouraged to display programs written by students and teachers for use by other subscribers.

"A 'mailbox' service allows users to exchange messages, accessible only with the correct passcode by the recipient."

The second source of revenue, software sales, allows subscribers to load in and save programs, about 50 programs at about £20 each. The third source of revenue is advertising.

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COMPANY PROFILE

Kevin Cahill reports on a breakthrough in semiconductor technology — and the men who made it happen

Superchip gives Trilogy the lead over IBM

Advertisers on Micronet pay rates from £100 a year for a single page to £50 a page for over 30 pages, while special positions are charged at higher rates.

Users can of course send electronic "mailshots" free of charge, but Hease argues that once the receiving users have seen it, they can flush it from their "mailboxes", whereas paid advertising cannot be erased by anyone other than the advertiser.

The first phase of Micronet is aimed at the home and educational market, and at certain target machines in particular: the BBC Micro, Tandy's Models I and II, the Commodore Pet 3000, 4000, 5000, the Sinclair Spectrum and ZX81, the Apple II, and Research Machines' range.

The main problem of connecting micros to Prestel is that they all have different display formats. Special interfaces have to be built. For example, the Sinclair Spectrum has to be converted from its standard 32-column format to Prestel's 40 columns and this can only be done with high resolution graphics.

Hease called in Silicon to do the job. "We had previously used a number of small software houses, but it became obvious we needed to get professionals in because timetables were slipping and documentation was not being produced. It's worth paying the extra money to get the job done properly."

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However, Nixdorf made his comments before anything was known, publicly or privately, about the revolution in semiconductor technology achieved by the Amdahls.

Since the beginning of this year a bevy of Nixdorf senior managers have visited Cupertino, and there is an unconfirmed story that Nixdorf's original \$6 million investment in Amdahl Corp turned into an exit profit of \$60 million.

It was predictable that the first announcement from Trilogy would be about a semiconductor.

Dr Amdahl is one of the most skilled integrated circuit engineers in the US. One of the reasons he left IBM was because of a dispute over the use of integration in circuitry for IBM's machines.

IBM's policy was to seek a technology that would fit all its machines, big and small.

Dr Amdahl believed big and small machines needed different forms of integration. He went on to use large scale integration in the Amdahl 40 series, while IBM stuck with intermediate integration and has since fallen further and further back in the technology stakes compared with Dr Amdahl.

Now, in his greatest challenge yet to IBM, Dr Amdahl, in partnership with his son, who is leading the design team at Trilogy, has produced a thermal cooled module many times more advanced than anything from IBM.

Typically, IBM's TCM has about 100 chips, each with about 600 logic gates. It functions by connecting the chips to each other in a complicated and expensive series of ceramic substrates.

As a recent report from the Gartner Group points out, IBM's TCMs were expensive to develop and took a long time to appear.

Trilogy's TCMs, by contrast, have taken only two years to develop,

and cost \$160 million to get into

test manufacture.

According to recent testimony

in the Hitachi case, IBM employs

This is 40% faster than IBM's current 3084 quadri-processor, and is expected to be at least 100% faster than the uniprocessor version of IBM's Sierra successor to the 308X range, which is to be announced later this year or early next year.

Dr Amdahl makes comparisons only between what IBM is currently offering, and what he has so far achieved with the pilot Trilogy device completed almost two years ago. But Peter Lake, a computer industry expert at New York brokerage Smith Barney Upsham, has said that, for its Sierra series, IBM will almost certainly have to move from transistor-to-transistor logic emitted coupled logic, if the main Sierra uniprocessor is to achieve the roughly 17 mips performance predicted for it by IBM's chip.

This raises an intriguing question about Nixdorf. Last September Heinz Nixdorf, the firm's chairman and an investor in Amdahl Corp when Dr Amdahl founded it, said he would not be investing in his old friend Gene Amdahl this time around. His reason, he said, was that Nixdorf did not want to be seen as a potential mainframe vendor.

The chip technology devised by Trilogy as the foundation for its new series of machines may be

Cupertino to talk about licences.

Already managers from DEC, Honeywell and Burroughs have visited the plant. So far only Cii Honeywell Bull, the financially stricken French computer company which was an original investor in Trilogy, has a formal agreement to use the new technology. And there are no indications whether Cii will take up its option, partly because of uncertainty about its own future, but the licences are not exclusive, so others will be free to bid for them.

The standard reference for components on a chip is Hewlett-Packard's 32-bit processor on a chip, which contains about 500,000 components. The Trilogy chip is 6cm square and has about three times as many active components as the H-P chip.

Normally a wafer contains several chips, and wafer level chips have not been attempted because of state-of-the-art limitations on device interconnects and controls.

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The Trilogy is expected on the market in early 1985 and sales prospects are good. But the firm may make more money out of licences for its semiconductors than from the Trilogy itself



Dr Gene Amdahl (left) and his son Carl, founders of the pioneering company Trilogy.

3,500 people in its mainframe labs, and launches, on average, a new mainframe architecture about every five years.

Industry commentators agree that \$250 million a year, which adds up to \$1.2 billion for each new IBM mainframe development. This contrasts with the 400 people who have put Trilogy on the edge of manufacturing a 45,000 gate TCM with more than 1,000 pin connections. The huge substrate, which has acted as a major barrier to would-be competitors to IBM, because of the cost of development, has been swept aside by the Trilogy team.

There has been one snag, however, which troubles Dr Amdahl — that is semiconductor delays, which have now accumulated to a total of six months and have moved first shipments back from late 1984 to early 1985. And costs have run ahead of the budget.

The Gartner Group, which recently issued an update on Trilogy, gave an estimate of \$250 million for further development at the company. In any case, \$400 million is small compared with the \$1 billion of sales that the Gartner Group says Trilogy could attract by 1986. And that doesn't include revenue from the new computer-aided design technology that Trilogy has used to get the huge chip built. Dr Amdahl says the company will sell this alongside the semiconductor technology, provided there is no competitive risk.

That Trilogy is bringing out its product at the beginning of a new IBM mainframe cycle is taken as a good omen by the Gartner Group, which points to the past successes of plug compatible vendors.

The Amdahl Corp machine was the first IBM compatible machine ever delivered or even conceived.

There was some good news for Trilogy recently when Datamation published the results of its annual survey of IBM users' buying plans. Of the 3,000 users who responded to the survey, 64% claimed unfamiliarity with the Trilogy product, which is hardly surprising, as most of the publicity

Trilogy has had so far has been in the UK Press, and the company has not advertised. But 5% of the sample said they would consider a Trilogy purchase. Among 3033 and 308X class users the response was even more positive: 17% said they were interested and only 24% indicated no interest in the new machine and 59% of users were unfamiliar with it.

Among Amdahl Corp users the news for Trilogy was even better: 34% said they were interested; 20% had no interest and 46% were unfamiliar with the product.

With more than a year to go before the formal definition of the Trilogy series, although it is known it will include a 100 mips vector processor, seasoned market researchers say there is a better than even chance that the first year's sales targets will be met.

The likely price of a Trilogy machine is in the region of \$4.3 to \$4.7 million, while the cost of an IBM Sierra is expected to be about \$3.2 million.

Dr Amdahl says there is still plenty of risk involved, but that the hardest part of the development is probably now over. Some of the investors who have been contacted seem very sanguine. One suggested that anyone who had not allowed for at least as much again as the original \$160 million, which was earmarked to

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These people see the strengths of the computer lying in its phenomenal computational speed, and its tireless accuracy; its weakness is the inability to reason.

Man's weakness, conversely, is in his accuracy and his stamina; while his strength is in his deductive prowess.

This leads to a peculiar choice: put very crudely our defence systems may either be placed in the hands of an accurate but unreasoning (in the literal sense of the word) machine, or in the hands of a reasoning but very fallible human being.

The acceptability of this choice is now being questioned, and the new concepts of expert or knowledge-based systems are beginning to be applied to the formulation of military software. The dangers inherent to the existing software, and the demands placed on future artificial intelligence are very neatly summarised in a report by Goodman and Brown: *Artificial Intelligence Applied to C2I*. (C2I, in military terms, stands for Command, Control, Communications and Intelligence).

A knowledge-based system is a program that works by using knowledge and inference procedure that would normally require specific human expertise. "They work," according to Roy Vaughan, projects director at SPL's Research Centre, "by encoding knowledge itself. An expert system will mimic the reasoning processes of human beings, and can therefore be circumscript in its decisions."

"As such, it exists as an adviser to man, and unlike the existing generation of military software, it will be able to explain its decisions, or inferences."

In other words, knowledge-based systems will model the abilities of the best human practitioners in any particular field, and hence an alternative description as an expert system.

SPL has designed and produced an expert system, *Sage*, and is working on a package aimed at real time environments for a mystery defence establishment.

The system described by Goodman and Brown has three major software components: a knowledge base, a situation database, and a control system. The knowledge base is the area that contains the system's expertise (for example, cause and effect relationships, inferences, heuristics, implications, and so on); the situation database contains a representation of the current situation; and the control system determines how best to apply the knowledge to the situation.

Specifically, the report goes on, "we are studying the role of a knowledge-based system in a strategic decision aid, commanding a subordinate in his own image."

This in turn suggests that the

function is more than just information storage, retrieval, computation, and display systems.

Future computer programs must supplement the human ability for using general knowledge to respond effectively in real time, emulate and follow human reasoning processes, acquire and apply knowledge, manipulate and communicate ideas, and focus attention (processing power) on relevant information.

Existing software methods are limited to relatively uniform processing on all the data presented and respond only to those specific inputs and situations that have been included in the program design. As the so-called solution space increases, these conventional software methods can no longer respond in the manner required in the military environment.

Recent advances in the technology of artificial intelligence as well as a number of commercial successes using artificial intelligence techniques indicate that artificial intelligence is on the verge of contributing to the solution of many of today's C2I problems.

Professionals like SPL's Roy Vaughan warn of the tendency to sensationalise modern technology into science fiction; but it is worth remembering that most of the world's early science fiction writers have proved to be conceptual prophets: we do travel under the seas in submarines, we do travel through the air in flying machines, and we can journey into space.

The professionals then point out that expert systems are merely advisers to man, and that there must be no direct link between the system and the firing button. History, however, has already

operations centre. The testbed hardware presently includes two Xerox 1100 processors, a Vax 11/780, and a Chromatics CGS 7900 display processor.

"The Xerox processors perform all primary computational support, currently Fortran calculations and sensor report preprocessing; the Chromatics provides high resolution colour displays, eg, maps, diagrams, etc. The Vax and Xerox processors are networked via Ethernet."

The system is designed to provide the military analyst with an interpretation of the current situation and possible courses of action. It is at this point that the layman begins to take alarm at the possible projections of such systems; put bluntly, can we be certain that expert systems will always stop short at simply giving advice?

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Conventional warfare suits software

MODERN technology has produced two distinct methods of warfare — total destruction (nuclear); and precision defence and attack. Electronics is concerned only with the latter, and indeed there are question marks over its operational efficiency within the turmoil of the unleashed nuclear energy of the former.

However, it is in the realm of the euphemistically termed conventional warfare that electronics in general and software in particular is playing an increasingly important role.

ECM and ECCM are already every day abbreviations in military phraseology, standing for Electronic Counter Measures and Electronic Counter Counter Measures. These are generally software controlled. Information is received by increasingly sophisticated radar and/or other sensors, digitised and processed, and consequent action initiated.

Electronic Counter Counter Measures will include safeguards to prevent this possibility. ECCCM will then be invoked to nullify the ECCM, and ECCCCM, ad infinitum. Future warfare will not be between mankind, but between different software systems!

At ground level, one of the major current projects is Bates, the Battlefield Artillery Target Engagement System, being developed by Scicon under subcontract to Marconi. Bates is a real

Cruise works on a different principle. It is preprogrammed to follow a set course to a predefined stationary target. It too hugs the ground to avoid detection, but rather than using radar to track its target, it takes periodic snapshots of the terrain.

These snapshots are compared to its programmed expectations (produced by sophisticated spy-satellites) so that on-board software can determine whether or not it is on target, and if not, what corrective action is necessary.

Electronic Counter Measures (apart from simply destroying the missile in flight) would probably take the form of persuading the software that the missile was still on target when it was actually heading out over the sea, or even back towards the launcher!

Electronic Counter Counter Measures will include safeguards to prevent this possibility. ECCCM will then be invoked to nullify the ECCM, and ECCCCM, ad infinitum. Future warfare will not be between mankind, but between different software systems!

British Sea Eagle, for example, is a prototype guided missile sometimes described as a cross between Cruise and Exocet (but at this stage non-nuclear). Its primary aim is to punch a hole below the water line of enemy warships. It is being developed for the Ministry of Defence in the first instance by British Aerospace, but with

The modern weapon is aimed by electronics, it is guided by electronics, and it is sometimes even exploded by electronics

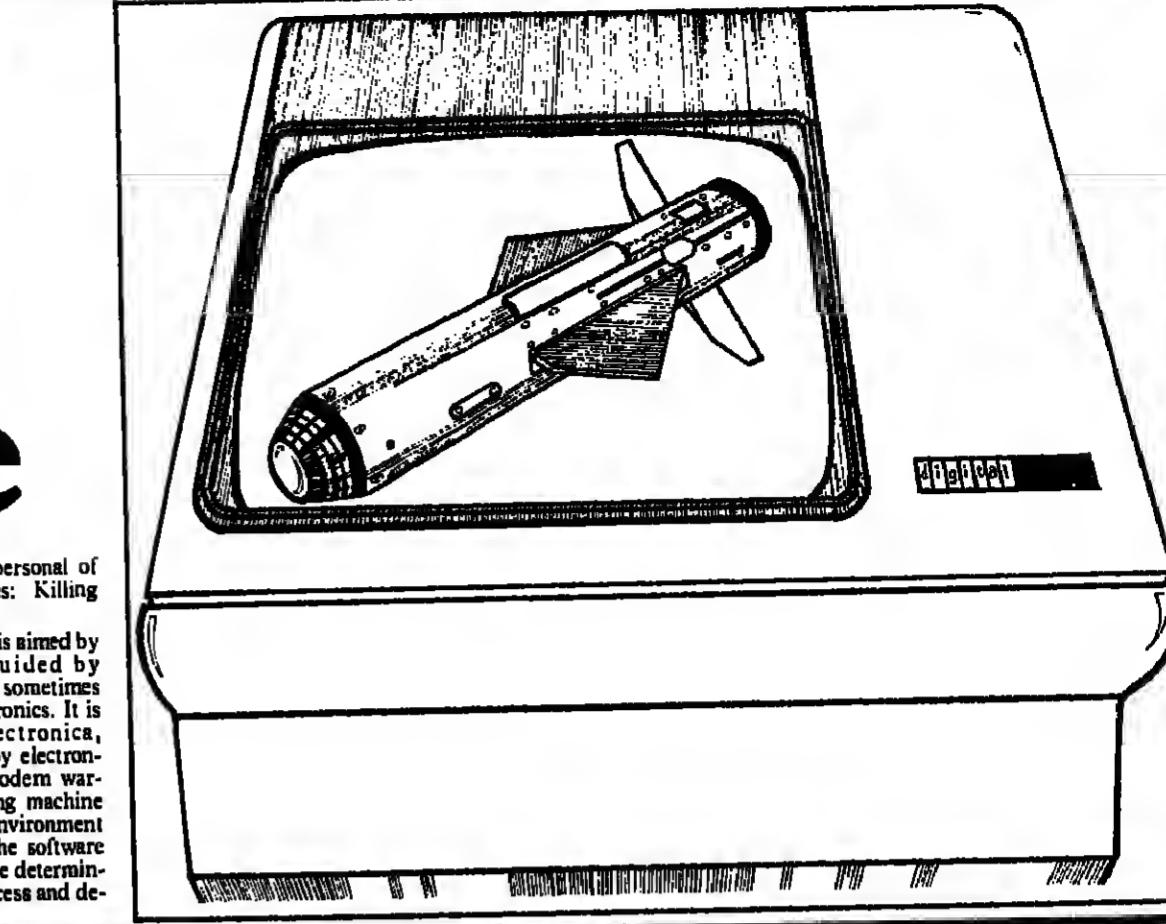
selected areas subcontracted to specialist companies. The software is being developed by Marconi.

Sea Eagle can be launched from helicopter or aircraft. Initial targeting data is loaded into the on-board processor from the carrier. Visual contact with the target is not necessary. Once this information is loaded the missile is launched. It has its own in-built radar and guidance system. It will select its target, and start to track.

It will also drop down to a few feet above the waves in order to avoid detection by the warship's own surveillance equipment. This will be met by Bates, which uses a database spread over a number of machines.

Meanwhile, the warship will soon or later detect the threat. Simple evasive action is probably useless since the missile is "homely" rather than merely aimed. Instead, the ship will probably produce an electronic smokescreen by ejecting tons of chaff (small strips of tin foil) into the surrounding atmosphere. This is ECM — designed to confuse the missile's radar system.

It will work. The missile's pinpoint target will suddenly disappear under a great cloud of electronic interference. But at this point, the on-board software must come into action. It must take into account the speed and direction of the ship up to the moment it "disappeared", the size of the chaff clouds, and perhaps even the speed and direction of the wind. It must then predict the most likely position of the ship within the chaff cloud. This is ECCM. The software must also be capable of distinguishing between a charred flock of birds, and between a ship and a whale.



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Acclaimed Ada has still to be born

IT is unlikely that there is anyone in the computing world unaware of Ada. But since the initiating force behind the language has always declared that it will not recognise part implementation of the compiler, and since there is still no recognised complete implementation, it must be the best known language that has never yet existed.

Ada was conceived in the mid 1970s when the US Department of Defence became increasingly concerned about the growing number of different and incompatible languages being used in defence projects, and the consequent maintenance bill that was even then estimated to be in excess of \$4 billion a year.

In 1975 a Higher Order Language Working Group (HOLWG) was established to produce a requirements specification for this new standard language. This specification was duly published under the codename Strowman, and the requirements were progressively refined into Woodenman, and then, in 1976, Tinman.

At this point 26 existing languages were evaluated to see if they met the Tinman requirements: none did, and proposals were subsequently invited for new programming language designs. Sixteen were received. From these, four were chosen. All were loosely based on Professor Niklaus Wirth's Pascal language.

Because of the sensitive nature of the contract, these four were given colour code names (Green, Red, Yellow and Blue, later identified as being led by CII Honeywell-Bull, Informetrics, the Stamford Research Institute, and SoTech), and were funded for six months preliminary design work by the DoD.

Following the preliminary designs, in 1978, the Red and Green designs were chosen for further design and appraisal. The project became Ironman. There is some suggestion now that the Green design would have been chosen immediately, had it not been for its European as opposed to North American origins.

As it was, half designs were requested from both the Green and Red teams, and after subsequent evaluation, Green was finally selected as the design specification for a new high level programming language. The project now became Steelman.

It was at this time that the name Ada was given, in memory of Charles Babbage's friend and accomplice, Ada Augusta Countess Lovelace, considered by many to be history's first programmer.

Most new languages take their name from an acronym of their functional description; but in this instance Common Higher Order Language for Embedded Real-time Application was not adopted.

The Green team was led by the then head of Ada Research of CII, but included John Barnes of SPL (who had earlier designed RTIL/2 while with ICL), and Brian Witchman from the National Physical Laboratory. With this involvement, it comes as no surprise that the UK, in general, and SPL in particular are aggressively striving to

release the first full Ada implementation.

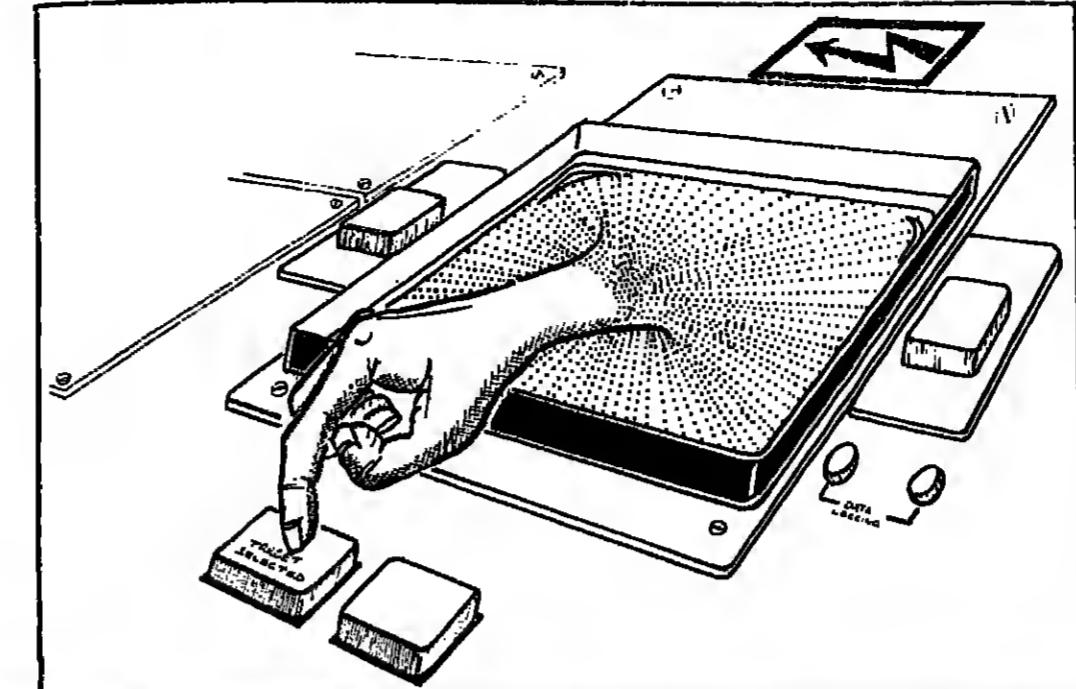
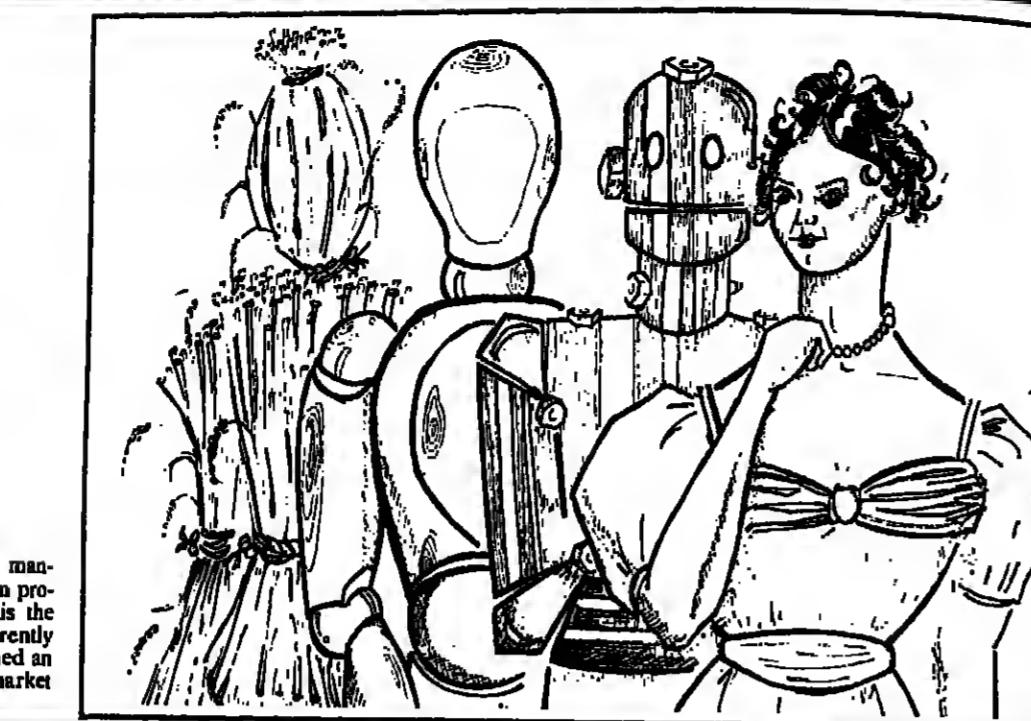
The potential market is enormous. If it was limited to US defence it would be large enough. However, it is likely that NATO in general will adopt the same standard, and at the same time, there is no reason to prevent the language from becoming a commercial standard as well.

"Ada is not conceptually innovative. In many ways it is simply a compilation of the best elements of all the best languages," says Jim Fisher, marketing manager at SPL. It has three major strengths: the ease of development and maintenance with an inbuilt security option, and an inherent portability. Individual tasks can be developed and compiled separately (hence providing security whenever different tasks are written by different development teams who individually have no knowledge of the overall program), and automatically linked at run time.

An extension of this concept provides for full concurrency where several tasks can run independently of each other, communicating only when required by "delayed rendezvous".

At such a rendezvous, the calling task executes an "entry call" and is itself halted until such time as the called task responds with an "accept" for that entry. The two tasks can then run together, or can exchange information as required; or can separate again until the next rendezvous.

Says John Barnes: "The best thing about Ada is its packaging,



Don't forget the quality

M. Leitch demystifies software quality assurance

THE Ministry of Defence is now finalising Defence Standard 00-16, *Guide to the achievement of quality in software*. When published, this standard will be called up in appropriate MoD contracts, and so is essential reading for anyone involved in quality assurance of software-based systems.

Software quality assurance crops up with increasing frequency within the industry but there is

still a lot of mystery surrounding it.

The common use of the word "quality" generally implies a degree of excellence. However, in engineering circles the word is concerned with fitness of purpose.

BS4778 defines quality as "the

totality of features and characteristics of a product or service that bear on its ability to satisfy a given need."

By this definition quality inspection would fail a Rolls and pass a Mini if the need was to fit a car into a 14ft garage. It just so happens that in most defence applications the important product features are also generally equated with a high degree of excellence.

Quality assurance (again according to BS4778) means "all activities and functions concerned with the attainment of quality." This is not very helpful and can lead to confusion over roles and responsibilities.

A more helpful definition is provided in the EEA document *Establishing a Quality Assurance Function for Software*, which is a less formal document than DEF STAN 00-16 and is recommended reading for those not familiar with quality assurance. Its approach is

The common use of the word quality generally implies a degree of excellence. However, in engineering circles the word is concerned with fitness of purpose

to define quality control as relating to "the mechanism by which quality is achieved" and quality assurance as being "concerned with the operation of that mechanism."

Quality control is largely the responsibility of the project manager and is concerned with ensuring that the desired quality is defined, achieved and verified. Quality assurance is the responsibility of a separate quality manager (or chief engineer) and is concerned with providing the management and customer with the confidence that quality control has been planned for, is being carried out, and can be shown to have been carried out.

The standards to apply on a project may be specified in the contract. However, the available standards do not cover all aspects of the production process in sufficient detail and these will require to be supplemented by the company codes of practice.

For each aspect of the project these should define:

- The formats of the documentation that must be produced;
- The procedures (or work instructions) governing the documentation;
- The standards of the documentation content.

The art of the software quality function is to make the software production process visible; hence the concentration on documentation.

Some defence contracts will require that the Defence Standard 00-21 *Quality Control System Requirements for Industry* will apply. In this case, it is a pre-condition that the Codes of Practice of the company have been inspected by MoD inspectors and that approval has been given.

Within the context of defence contracts there can be considerable variation in the quality attributes required. Consequently, it may be necessary to select from or add to the existing company codes of practice, and in this case it should be agreed with the MoD project officer or quality assurance representative.

In addition to the codes of practice, it is necessary to produce a quality plan. This is specific to the contract and states how, when and by whom quality activities will be carried out throughout the life of the project. In QTM 16 *Quality Assurance in the Programming and Use of Computers* (eventually to be superseded by Defence Standard 00-22/1 Part B), the quality plan is identified with the project plan, and the two require to be produced in conjunction with each other.

However, their distinctive roles should be recognised. A great deal

SONY's 14-inch colour terminal was specially designed for general office use. Its simple, anyone can operate it. And because it's a compact one piece unit opposed to a terminal sitting on a plinth, it takes up less desk space.

of course, like its larger and smaller counterparts, the 14-inch colour terminal gives unrivalled picture quality.

There's no smaller colour view-data terminal in the world than the Sony 9-inch desktop model. It gives you some uniquely advanced message facilities as well as a 14 page memory and a key-page function.

During the development of the terminal, we've been working closely with our customers to make sure the product is right for them. We've been doing this for over 20 years, and we're still doing it.

For your information, nobody does more than Sony.

COMMUNICATION SYSTEMS DIVISION

SONY

John Barnes

The Sony range of Viewdata terminals is built to the highest standards. The most complete range of Viewdata terminals in the world. For more information, write to: Customer Services Department, Sony Communication Systems Division, 27/28/29/30, 3rd Floor, 100 Newgate Street, London EC1A 7AL.

COMMUNICATION SYSTEMS DIVISION

SONY

John Barnes

Multifunction terminal is a comfort for operators

A DISPLAY station, the UTS 30, designed to provide operator comfort and easy of use, has been introduced by Sperry Corp.

Available in two versions, the UTS 30 can function as a powerful editing terminal or as a user-programmable terminal and desktop computer. It supports a variety of peripheral devices, including four printers, a 3½-inch diskette subsystem with up to 2.6 Mbytes of storage, and a magnetic strip reader.

The editing version of the UTS 30 can be field upgraded to the programmable model by replacing a program cartridge with a diskette interface and connecting the diskette subsystem.

Eye fatigue is reduced by using low contrast colours for the display screen and keyboard and by providing background illumination and improved focus on the display. The anti-glare, 12-inch diagonal display consists of green characters on a dark background. The entire display is claimed to be flicker-free. The field of view of the display is within normal eye span, while a moveable base allows horizontal and vertical adjustment to the best viewing angle.

The new "low-profile" keyboard is designed for comfortable touch-typing and to avoid strain on



Sperry's UTS 30 display terminal.

the back. All the control keys required to operate the terminal and initiate data transfer are located on the keyboard and easily reached.

For the basic version of the UTS 30, a program cartridge, accessible from the top of the unit, provides the editing functions. System updates and future UTS 30 enhancements can be achieved by inserting

a new cartridge.

In the programmable version, the program cartridge is replaced by a diskette interface that supports up to four diskette drives.

Sperry (CW), Computer Systems, Sperry Centre, Stonebridge Park, London NW10 8LS. Tel: 01-965 0511.

Process control devices

THE 3000 series of digital instruments from Computing Techniques is a family of low-cost, high technology tools which feature the popular Beckman display.

They can be supplied in standard or ruggedised form. This family has been designed to directly interface with most standard microcomputers in process monitoring and control applications.

The most advanced model is the microprocessor-controlled 3060 which can be directly programmed from a keyboard thus enabling the end user to update the ranging or data transfer ratios to suit changing requirements.

This allows flexible scaling without the need for external components.

Distributor and agent enquiries are welcomed.

Computing Techniques Mfg Ltd (CW), Brookers Road, Billingshurst, West Sussex RH14 9RZ. Tel: (0438) 3171.

It shows four digits on the 0.6in

Low-cost draughting

SERVELEC has launched a high-performance, low-cost computer-aided draughting system.

The Superdraft CAD system is a complete stand-alone two-dimensional package offering all the advantages of an expensive, up-market system at a cost designed to fall within the reach of firms both large and small.

Operating in conjunction with the Superbrain QD desk top computer, Superdraft offers an accurate draw, edit, and modify facility.

Servelec Computer Systems (CW), Atlantic Street, Altringham, Cheshire WA14 5DD. Tel: 061-941 2327.

The Servelec Superdraft CAD system.

Wang extends VS systems family

WANG has extended the low end of its Virtual Storage - VS - product line with the introduction of the VS 25 and VS 45 Distributed Office Systems.

The VS 25 and VS 45 are targeted at small to medium-sized companies, for remote, or departmental-level processing, but both systems incorporate all the traditional features of Wang's large VS 80, VS 90 and VS 100 systems.

Each model features a 16-bit CPU, with 32-bit datapath and a new, microprocessor-based system architecture, utilising 64K-bit RAM chips. Both offer fully loadable control memory, allowing all operational microcodes to be loaded from disc, or diskette, at system start-up time and full software compatibility into the entire VS product line. The systems also provide one megabyte of virtual address space per task and, subject to British Telecom approval, remote diagnostic capability.

Says Ian Derry, Wang UK managing director: "While the VS 25 and VS 45 systems incorporate new processor technology and a newly implemented system architecture, they are software compatible with the entire VS product

Service firm offers repairs within one day

THE hardware maintenance division of Software Sciences has introduced three levels of service, aimed at providing users with a clear idea of the maximum equipment downtime they are likely to experience. The highest level of service, with equipment removed from site being returned within one working day, or a loan machine supplied free of charge.

At Level 1, an engineer will respond to a call within eight working hours of the fault being reported to the hardware maintenance division's service control centre. If the equipment cannot be repaired on site, it will be taken to the nearest Software Sciences engineering workshop for repair and will be returned within 10 working days.

If, for whatever reason, the hardware maintenance division is unable to complete the repair within this time, a loan replacement machine will be supplied free of charge.

Software Sciences' Hardware Maintenance Division services third party maintenance of installed micro and minicomputer systems and peripherals.

With hundreds of customers throughout the UK, the hardware maintenance division services printers, VDUs, terminals, communications devices, word processors, point-of-sale terminals and small business systems.

Software Sciences is part of the Information Technology Division of Thorn EMI.

Software Sciences, 282-292 Farnborough Road, Farnborough, Hants. Tel: (0252) 544321.

the back. All the control keys required to operate the terminal and initiate data transfer are located on the keyboard and easily reached.

For the basic version of the UTS 30, a program cartridge, accessible from the top of the unit, provides the editing functions. System updates and future UTS 30 enhancements can be achieved by inserting

a new cartridge.

In the programmable version, the program cartridge is replaced by a diskette interface that supports up to four diskette drives.

Sperry (CW), Computer Systems, Sperry Centre, Stonebridge Park, London NW10 8LS. Tel: 01-965 0511.

Under Level 2, an engineer will respond within eight working hours of the fault being reported, and if the fault cannot be repaired on site, it will be taken back to a workshop and returned within two or three times as many users on the LSI/23 that was previously possible, according to Darkcrest.

The system includes standard an industry compatible magnetic tape transport, resulting in media compatibility with IBM, DEC, and others. The read/write speed of up to 100 ips at 1,600 bpi allows users to back-up the entire contents of their Winchester in minutes. Options include the aew, standard 3,200 bpi and average tape throughput speeds up to 200 ips for specialist users.

The system is suitable for an office or laboratory type environment.

Darkcrest (CW), Chapel Court, Borough High Street, London EC1. Tel: 01-403 5060.

Burroughs display is a gas for data

THE DISPLAYS division of Burroughs OBM marketing corporation has launched in Europe a new 400-character gas plasma display panel for use in data terminals. With an 80-column format, and 100% pixel addressing, the panels are suitable for alphanumeric and graphics displays in commercial and industrial applications.

Another benefit is the increased density of dot spacing compared with conventional gas plasma displays.

A touch-sensitive overlay is available, enabling data to be input directly into the data processing system simply by touching the required part of the display panel. In some applications, this could eliminate entirely the need for a conventional keyboard.

The new panels offer a 130 degree horizontal and vertical angle of view, and enhanced relative brightness (58N, 28uc). They are suitable for use in rugged industrial environments, where high levels of shock and vibration and extremes of temperature are encountered.

The optional touch-sensitive overlay (TSO) consists of a pressure-sensitive sandwich construction which is fitted to the front of the display panel.

Burroughs OEM Marketing Corporation (CW), Langwood House, High Street, Ruislip, Middlesex, London HA4 1JZ. Tel: (0895) 70454.

Wang (CW), 661 London Road, Jarrow, Tyne and Wear, NE13 7JZ. Tel: (092) 26271.

Darkcrest launches new range

DARKCREST has launched a new range of computer systems based on the Digital Equipment LSI 11/23 16-bit processor board.

Called the GT 2309 Series, the new system will run a wide range of operating systems from DEC and other suppliers, including RT11, RSX11-M and IIM PLUS, RSTS/E, DSM-11, Cobol, Fortran 77 and Basic Plus 2. In addition, available from other sources through Darkcrest, are the Unix operating system and the new ANSI standard Mumps.

Darkcrest's GT 2309 hardware package system starts at £13,000 and includes a 256 Kbyte LSI/23, the first 70 Mbyte fast Winchester disc drive and an industry standard 2400ft reel magnetic tape transport with the first four-line interface.

Options include MOS memory of up to 2 Mbytes, up to four 70 Mbyte Winchester and 32 serial lines - all being available as an integral 3ft cabinet computer system.

A key feature of the new package system is the speed of the Winchester disc drives. With a transfer rate of over 1 Mbyte per second and an average access time of 28 milliseconds, this eight inch Winchester disc drive is one of the fastest on the market. In particular, such performance capabilities allow two or three times as many users on the LSI/23 that was previously possible.

The package, called Genie, is

designed to meet most users' CAD requirements, it can be easily expanded, with additional storage and plotting facilities.

Genie is easy to use, being operated by special function keys. Commands can be implemented by a four-character name in separate files.

Text is fully scalable in both X

and Y co-ordinates and strings of text may be rotated and slanted.

Genie provides powerful editing

facilities, allowing the operator to

erase, move or alter any part of a drawing. Block editing enables a complete drawing or particular

section to be scaled, rotated, moved and copied. A further facility allows linear and circular repeat of block copies.

Although the standard Genie system will meet most users' CAD requirements, it can be easily expanded, with additional storage and plotting facilities.

Genie is ideal for existing users of the HP9845 who want to enter CAD without the expense of additional hardware. It is equally suitable for the user who wants an all-round computer system not only for draughting but also for technical and business applications.

The system is suitable for an office or laboratory type environment.

Norris Hill (CW), Albany House, 489-491 London Road, Caversham, Berkshire RG4 1JA. Tel: (0276) 681655.

The Industrial II from Instem Systems.

Rapid way to Alter your text

RAPID Recall can now supply a new text editor for use on Intelec Series III microcomputer development systems, direct from stock. Known as the Alter Test Editor, it is menu-driven and has been designed to be easy-to-learn and easy-to-use.

In addition to providing full screen editing facilities, Alter offers features such as move, copy and delete that will easily handle large blocks of text. Additional commands are also available to find and selectively replace blocks of text.

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The Industrial II from Instem Systems.

Industrially packaged LSI-11 computers

A SPECIALLY packaged LSI-11 computer from Instem Computer Systems is announced for monitoring and control applications in industrial environments.

The Industrial II system offers unique configurations based on the full range of DEC LSI-11 family of processors including LSI-11/23 Plus and provides full compatibility with standard DEC software and operating systems.

All models are housed in 19in

card cases and have the ability to

meet diverse application require-

ments, with a wide range of

memory, communication and

print/plotter modules.

The basic system comprises a

controller rack housing three sec-

tions: Q-Bus control, plant input-

output, and power supplies. The

system is designed with vertically

orientated modules, and a single

19in controller rack offers a com-

pact yet powerful system, with full

smaller and twice as fast as Oregon

Software's Pascal-1 compiler, the

forerunner to Pascal-2.

A key feature of Unix is the

supporting tools that provide a

software developer with standard,

easy-to-use programs that aid in

coding and development.

The Pascal-2 compiler system

contains code being debugged, keeps track of multiple compilation units and

performs breakpoint debugging

without slowing the application

code.

With data supplied by the

profiler, the developer can reorga-

nise portions of the code to im-

prove substantially overall execu-

tion speed.

Ulti-C (CW), Dominion Way

West, Broadwater, Worthing,

West Sussex BN14 8NT. Tel:

(0903) 21214.

The Praxis 41 printer/typewriter.

The Praxis 41 key-

board.

When not being used as a printer,

the Praxis 41 has the functions

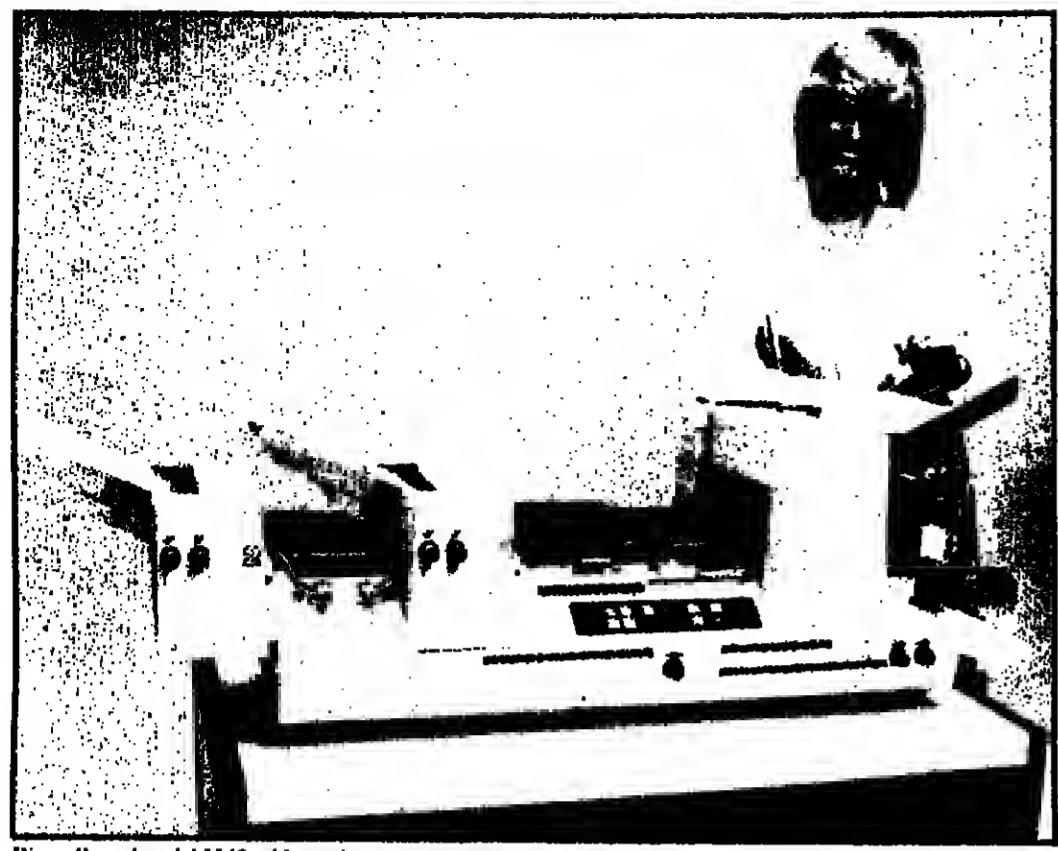
of a sophisticated electronic type-

writer. These include 100 printin-

g characters, interchangeable

dials/wheels, 17 function keys,

repeat key, cancel key, correction



Pitney Bowes' model 3340 table-top inserter.

Inserter '16 times faster than a human'

A USER friendly inserter designed for handling a variety of documents such as invoices, statements and reminders and direct mail pieces has been introduced by Pitney Bowes.

The new machine, model 3340, is a table-top inserter suited to insurance companies, local authorities, government departments, building societies, professional practices, stores, large offices, wholesalers and distribution houses, says Pitney Bowes.

The 3340 automatically puts up to two inserts into envelopes, typically items such as letters, bills, cards, leaflets, business reply

envelopes and advertising matter.

Major features of the 3340 - reliability, fast throughput, easy servicing, simple set-up/operation and low-cost - were named as most important by potential users during detailed market research conducted by Pitney Bowes, which anticipates meeting virtually all the demands of the market for such products.

Its speed, 3,600 cycles an hour, makes it about 16 times faster than a human doing the same task, enabling it to keep up with computers and copiers generating material for mailing.

Operating the system requires a

Sales registers now have chip memories

THE latest phase in the upgrading of the NCR 2140-7000 series of electronic sales registers is now available. The Phase IV registers have chip-based mass memory (back-up storage) instead of floppy disc storage. This is claimed to make price look-up faster, more accurate and more reliable than flexible or floppy disc storage.

The NCR 2140-7000 series was launched in 1978 and, as subsequently updated, has features still considered advanced, including:

- Standard proprietary types of memory storage;
- Distributed intelligence, allowing optional local processing at terminals;
- Cassette data capture at point-of-sale, plus direct communications to a central processor;
- A range of fast answer printers;
- Time-of-day recording and reporting;

Price look-up software can be tailor-made by NCR, which will train customers' staff.

Prices of the new registers start at about £2,000.

NCR (CW), 206 Marylebone Road, London NW1 6LY. Tel: 01-388 8244.



THE NCR electronic sales register upgraded to provide stock control for retailers at low cost.

Financial planning on Zilog 8000

AN advanced financial planning system is now available for use on Zilog's System 8000 Supermicro. Known as Micro FCS, it has been written by BPS Consultants using a product that has taken over 100 man years to develop and incorporates eight years of experience in planning systems.

BPS Consultants currently has mainframe planning systems installed in more than 700 companies.

Taking advantage of the Unix operating system and the networking capability of System 8000,

Micro FCS can be used for long-term financial planning, cashflow, budgeting, consolidation and manpower and production planning applications.

The system is based on simple English instructions which allow the user to define precisely the relationships, calculations and report formats required. A range of functions such as depreciation taxation, Net Present Value (NPV) and Discounted Cash Flow (DCF) are pre-programmed into the system to save time.

Micro FCS will run on Zilog's

Range of peripherals for the OEM market

A RANGE of industrial peripherals, utilising advanced mask-programmed microcomputer technology, has been introduced by ISG of West Germany, the new range has been developed specifically for the OEM market and offers a number of unusual features.

The Gercom terminals, the Micropro/1 and Micropro/80, are available either as portable units or for rack mounting.

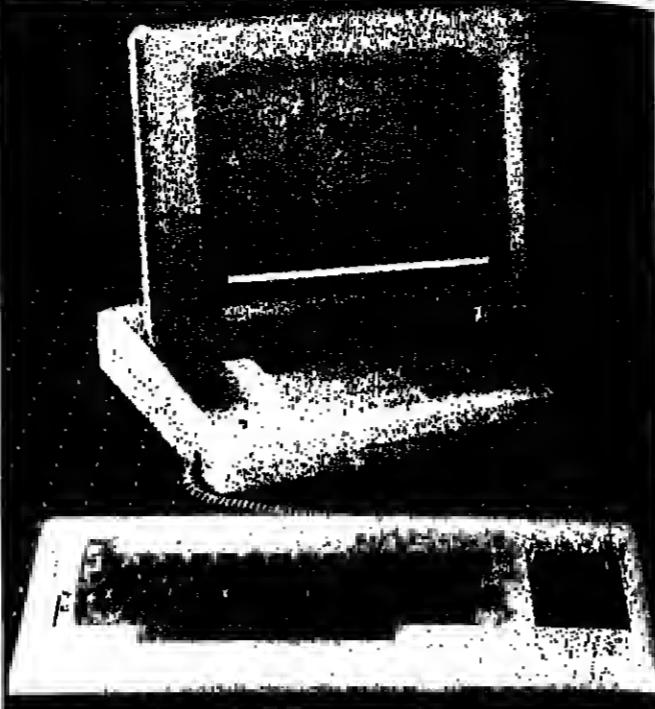
Designed to serve the needs of both OEMs and end users by interfacing to remote computers and other similar equipment, features include cursor control, eight auxiliary outputs and the ability to provide customer-defined control functions by extending the internal firmware. Special dustproof models are also available.

The Micropro/1 range has a 32 character by 16 line display format with full ASCII keyboard and a switchable printer output. Fourteen control functions (plus buzzer) and 19 extended control functions are provided, as well as eight auxiliary control functions switchable via the serial link and keyboard. Two card construction simplifies field maintenance and each character may be individually inverted and/or set to half intensity.

The Micropro/80 is similar to the Micropro/1 but built to a fuller specification with a choice of larger screens.

Features include a 24 line display format, an additional 16 non-volatile function keys, more control functions, self-diagnostic testing and a programme memory of 40 Kbytes.

ISG Data Sales (CW), Unit 5, Wellington Industrial Estate, Basildon Road, Speccers Wood, Reading, Berkshire. Telephone: (0734) 884666.



The Qume QVT terminal now available from ISG Data Sales.

Menu set-up made for ISG's Qume terminals

ISG Data Sales has introduced two Qume terminals at prices from £320. The QVT 102 and 108 emulate the Lear Siegler ADM5, the Televideo 910, 912, 920 and 925 and the Hazeline 1300, but have extra features and cost less.

Features of the terminals include a menu set-up mode instead of DIP switches; a 7x9 character format with descenders for good readability; 11 function keys on the QVT 102 and 22 on the QVT 108; a built-in line drawing set for making up charts, graphs and forms; a 25th serial line; line and page block transfer modes; and insert/delete line and character functions.

The cheapest model, the QVT 102, offers an 80 column 16 line display in green or amber, which tilts and swivels, and the separate keyboard has a low profile numeric pad, defeatable auto-repeat and key click.

The QVT 108 emulates Televideo models 910, 920 and 925 and similar to the 103 but with extra function keys, plus two pages of screen memory.

Both the 102 and 108 have a serial auxiliary printer port as standard, which may be addressed via a single key stroke.

ISG Data Sales (CW), Unit 5, Wellington Industrial Estate, Basildon Road, Speccers Wood, Reading, Berkshire. Telephone: (0734) 884666.

Protocol converter for IBM, Univac systems

A PROTOCOL converter has been launched that allows users of IBM and Univac systems to add low-cost, Tektronix-compatible Color Retro-Graphics terminal enhancement from Digital Equipment.

In an IBM environment, the Colorscape graphics terminal can be connected at high baud rate over IBM supported network systems. Additionally, the device will fully emulate 3270 terminals and can communicate with 3270X applications, including CICS and IMS.

Digital Engineering (CW), 69 Berent Drive, Sacramento, CA 95814. Tel: (916) 447-7600.

with other host systems, for example DEC or HP, from the same Retro-Graphics terminal.

In an IBM environment, the Colorscape graphics terminal can be connected at high baud rate over IBM supported network systems. Additionally, the device will fully emulate 3270 terminals and can communicate with 3270X applications, including CICS and IMS.

Digital Engineering (CW), 69 Berent Drive, Sacramento, CA 95814. Tel: (916) 447-7600.



Digital Engineering's Color Retro Graphics enhancement.

Higher capacity cartridge drives

TO meet the increased demand for higher storage capacities within the 3½in Winchester fixed/ removable disc drive market, Advanced Peripheral Products has introduced the higher capacity Micro-Magnum 5/10 and 5/15 cartridge drives.

The drives incorporate a patented design innovation leading to improved packaging, increased system reliability and increased data integrity. These

System 8000 is fully expandable, and will be compatible with the next generation of 32-bit microcomputers.

Zilog Systems Division (CW), Zilog House, Monksbridge Road, Maidenhead, Berks. Tel: (0628) 39200.

drives provide the same capabilities as half-height fixed and removable drives operating from separate resources. The Micro-Magnum drives are form-factorised for use in desktop, mini and micro-computer systems with front-panel dimensions identical to

those of standard 5½in floppy disk drives.

The drives incorporate a

Micro-Magnum 5/10 version offers 19.5 Mbytes of unformatted storage capacity, with 13 Mbytes stored on removable cartridges.

Advanced Peripheral Products (CW), Graham House, Twickenham Road, Feltham, Middlesex TW13 6HA. Tel: 081 828 0034.

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Ideally, applicants will be able to demonstrate success in selling micros or total solutions into the end user marketplace, although consideration will be given to applicants with a good business acumen and sales ability.

In return for a high degree of commitment, you can be assured of a challenging, long term career path, and have the potential to earn in excess of £20K per annum.

For details of this outstanding opportunity please telephone Barbara Allen on 0734-595346, or write to the Reading office enclosing a full CV.

Ref. 104



MC CLOUT COUSINS LTD.

27-29 Greyfriars Road,
Reading, Berkshire
Telephone (0734) 595348 (24 hours)

Chesham House, 150 Regent Street,
London W1R 5FA
Telephone 01-439 8288

ITT EUROPE is a leading multinational company with activities spanning over several products and businesses, including telecommunications, consumer electronics, engineered products, hotels and insurance.

Due to an internal promotion, the position of

CORPORATE AUDIT REPRESENTATIVE-EDP

is now vacant, and we seek candidates interested in joining our company, renowned for its sophisticated computer-based financial systems and professional management.

This open position reports to the Audit Manager - EDP, based at ITT Europe Headquarters in Brussels.

Major responsibilities are: assess the financial and operational functions in the assigned European units (these are primarily based in Italy, Spain and France); ensure compliance with corporate and local policy and procedures; identify opportunities to improve internal controls, operational effectiveness and, ultimately, profit assurance.

The ideal candidate will have several years of EDP audit experience, acquired in a multinational, multi-business manufacturing environment; the ability to influence senior levels of management; work with a large degree of autonomy; write concise and lucid reports.

The incumbent may be of any nationality but, in addition to English, he must be proficient in at least one of the languages of the countries in which he operates (Italy, Spain, France). The job location may be in Italy, Spain, France or Belgium, with frequent international travel. Compensation and benefits are likely to attract even the most demanding candidates.

Please apply in confidence to Universal Communication, chaussée de La Hulpe 122-130 1050 Brussels, Belgium.

Please mention on the envelope the reference 981.

UNIVERSITY OF EDINBURGH EDINBURGH REGIONAL COMPUTING CENTRE

ASSISTANT COMPUTING OFFICERS (3)

The Computing Centre has vacancies in its Computing Department for three Assistant Computing Officers and in its Edinburgh Regional Computing Centre for research services to the University of Edinburgh and in a number of Government funded research institutes.

The Computer Group's primary responsibility is for the development and management of computing services for the central services provided by the Edinburgh Multi-Access System on its 12,000 terminals. The Edinburgh Regional Computing Centre provides computing services to the University of Edinburgh and in a number of Government funded research institutes.

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Exceptional Young SYSTEMS ANALYST

Financial Software: HP 3000

c £14,000: rising to £19,000

Our client is one of Europe's fastest growing electronic companies. Their success is built on market leadership, high profitability and continuing major investment in advanced micro-technology and an attractive new facility. Equally, their personnel policies for graduate-calibre, success-oriented professionals are outstanding.

World demand for an expanding product range and 100% real growth creates this new opportunity. You will take personal responsibility for the active development and maintenance of software to meet wide-ranging commercial needs, in the UK and Europe.

Ideally a graduate in computer science/math, you must have successfully implemented yourself financial packages through the complete development cycle. HP 3000 experience an advantage; modifiable age 21-30.

As importantly, you must have the personality, flexibility and commercial flair to be effective across the total spectrum of sales, marketing, personnel and manufacturing functions. Excellent career prospects as products become increasingly software dependent.

Starting salary will be c £11,000, in a range to £19,000. A valuable non-contributory benefits package and relocation assistance to the Thames Valley are company this.

Initially, please phone or write, in complete confidence, to **Ivor Harland at Kramer Westfield Associates, 23 Victoria Street, Windsor, Berks, SL4 1HE. Telephone No. Windsor (0751) 56153.**

Kramer Westfield

SAUDI ARABIA DATA COMMUNICATION SALES £15K BASIC + COMM. = £30K TAX FREE PACKAGE

To promote and sell a range of 'MICOM' and 'BLACK BOX' products.

The ideal candidate, aged 25-35, will have at least two years' technical sales experience, some of which will be in the Middle East. A background in Data Communications, Telecommunications or Computer Hardware is desirable. Experience of full sales support of complete communication systems would be advantageous.

Along with the basic salary and commission would be a company car, free accommodation, one month's paid leave/p.p. and return air tickets.

For full details contact:
SAPE INTERNATIONAL RECRUITMENT CONSULTANTS
County Chambers, Weston Road
Southend, Essex
Telephone: (0702) 333272
Telex: 996478 Lawyer G

(4000)

LOLA

London On-Line Local Authorities is a data processing consortium of four London Boroughs based in modern offices at Enfield. Currently we have two large IBM computers - a 370/168 AP and a 4341 model 2 - due for replacement this year. We have a teleprocessing network of over 300 terminals and our computer applications span a wide range of activities and current technology. We use TSO/SPF for programming work.

We have vacancies for

Programmers £7,500-£11,000 Trainee Programmers £5,500-£7,500

Programmers should be experienced in PL/I and will be required to work on both batch and teleprocessing IMS systems. Applicants should have at least 18 months' good programming experience and have worked in teleprocessing. The starting salary will depend upon length and type of experience.

For the trainee posts we require either graduates or TOPS-trained people (graduates preferred) who have successfully completed PL/I courses. For trainees with no relevant experience the salary will be near the bottom of the scale but could be higher for applicants with PL/I experience.

Further details and application forms (closing date for return by 10th June, 1983) may be obtained from:

Beryl Darrington

LOLA

Tower Point North

Syndicate Road

Enfield, EN2 8JG

Tel: 01 348 8611, Ext. 278

LOLA

WELSH JOINT EDUCATION COMMITTEE CYD-BWYLLGOR ADDYSG CYMRU

COMPUTER OFFICER Salary £10,071-£12,174

Readvertisement at Increased Salary

Applications are invited for the post of COMPUTER OFFICER for the Computer Section of the Welsh Joint Education Committee. The Committee uses an ICL ME 29 running an on-line examination system and the person appointed will be responsible for managing, maintaining and enhancing the system.

The salary will be in the range of £10,071-£12,174 (£10,071-£12,174) and the starting salary will depend upon experience. Applicants should preferably be graduates with experience in the following areas: Recent systems analysis, programming in COBOL and working on an ICL ME29.

Further details and application forms (to be returned by 30th June, 1983) may be obtained from the Secretary, Welsh Joint Education Committee, 245 Western Avenue, Cardiff CF5 2YX.

CHALLENGING OPPORTUNITY WITH LEADING BRITISH MICRO MANUFACTURER

GROUP LEADER (LABORATORY PRODUCT DEVELOPMENT)

£12K TO £17K
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This is a challenging new opportunity to spearhead our product development programme in the laboratory/instrumentation market.

Research Machines has already built up an impressive base for its computer systems across the spectrum of scientific research applications. Our corporate plan now calls for a major expansion in this sector through the development of innovative microcomputer-based hardware and software products using state of the art technology.

Your role will be to create and lead the small team responsible for this important development work. In particular you will:

Support the Marketing Department in developing product strategy and defining new products; Specify, plan, manage product development projects to rigorous standards of performance, quality, and time scale; Build, run and manage a group of professional

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ANALYST/PROGRAMMER with experience of RSTS/E and Basic Plus

Applications are invited from suitably qualified people with two to three years' experience gained on Sysline/PDP11 hardware. Main duties will include assisting the DP Manager to implement and further develop the company's commercial and production control systems and therefore knowledge of such areas should be an advantage. Graphics experience may also be considered useful.

Applications in writing, giving full details of qualifications, present salary and career, to:

Peter Williams, DP Manager
ACME MARLS LTD,
Clough Street, Henley, Stoke-on-Trent ST1 4AF

(3000)

Defence ADP Training Centre Lecturer- Computer Systems

The Centre at Blandford Camp, Dorset is responsible for the professional ADP training of officers and NCOs of the Armed Forces and MOD civilians. It has a DEC KL mainframe computer with 2 PDP mini-computers for front-end and remote processors. Two Ferranti Argus 700G computers are used for real-time training. All courses are residential.

The range of basic courses covers fundamental professional training, systems analysis and design, and programming. Other courses cover real-time systems and project management. There is an Advanced Course (30 weeks) in preparation for BCS examinations.

The person appointed will be expected to lecture to all courses (training will be given, if necessary, in particular aspects) and to contribute to the development of the subjects taught.

Ministry of Defence

SIGMA/CP5 CUSTOMER SUPPORT

A consultancy role for an experienced

SYSTEMS PROGRAMMER

£10,000-£12,000 p.a. Slough

Honeywell is a name associated with excellence — both in our product range and in the success and professionalism of our multi-national organisation. We pride ourselves on providing our customers not only with advanced systems to meet their needs, but also the highest level of post-sales support.

Now, with this in mind, we are looking for someone with sound experience of programming on Sigma systems operating under CP5 to join us in a vital support and consultancy role.

Based in our Southern Marketing Office in Slough, you'll be liaising directly with Honeywell CP5 Users throughout the UK and will also become directly involved in the CP6 operating system and other newly introduced hardware and software products, undertaking on-site project work as well as general consultancy and problem-solving activities.

It's a highly visible role that requires in-depth experience in the use and support of Sigma software together with excellent interpersonal skills and the ability to quickly extend and develop your technical skills into new areas.

In return we offer an excellent salary in the range £10,000-£12,000 dependent upon experience, plus a full range of benefits including excellent training and career development prospects within our progressive organisation.

Please write to David Abbott, Honeywell Information Systems Ltd., Honeywell House, Great West Road, Brentford, Middlesex.

Honeywell

DATABASE DESIGNERS — ANALYSTS — PROGRAMMERS

We wish to recruit a number of experienced computer professionals for Tangent's Systems and Programming Support Team. Enquiries will be welcomed from both contract or permanent staff and we can offer attractive opportunities and excellent remuneration to all successful candidates. Current requirements include the following:

DEC/VAX, COBOL
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SUCCESS IN THE SOFTWARE WORLD

Project Managers

A major international development engineering centre with existing growth plans requires experienced software engineers to fulfil project management roles. Candidates must be capable of technical leadership of up to 30 man teams in the area of communications, or real time software. The company offers excellent long term careers and attractive benefits. Relocation assistance.

Contact Terry Harvey

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One of the country's leading technical systems houses is continuing to expand and requires bright, graduate, electronic designers to work on circuit design, micro systems design, low power logic and custom logic. We would like to hear from people with a minimum of one year's experience. Assembler level programming ability would be advantageous.

Contact Brian Coates

London to £10,000

One of the country's leading technical systems houses is continuing to expand and requires bright, graduate, electronic designers to work on circuit design, micro systems design, low power logic and custom logic. We would like to hear from people with a minimum of one year's experience. Assembler level programming ability would be advantageous.

Contact Brian Coates

Tech. Authors

We would like to hear from Technical Authors with 2 or more years experience who would find the challenge of working closely with software development teams to their liking. Background should include programming or previous software technical writing experience. There are additional opportunities for authors with mixed Hardware and Software ability. Excellent career prospects.

Contact Terry Harvey

Herts. to £13,000

Software engineers and electronics engineers are required to participate in major new product developments in communications, office system products and L.A.N. applications. Previous experience is only confined to technical applications. The primary requirement in this company is a positive attitude and a desire to succeed. The company has an excellent program of internal training. Relocation assistance.

Contact Terry Harvey

PDP and VAX

Experienced software engineers who have two or more years experience implementing programs in a technical environment will find our clients have many challenging projects for them. We are particularly keen to hear from people with a mixture of assembler and high level programming ideally to include knowledge of micros and Pascal.

Contact Brian Coates

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Contact Brian Coates

Tandem Comms. N.W. M'sex. £9K-£13K + car

This expanding, turnkey vendor of Tandem computer systems is seeking highly motivated software people to work on advanced applications using Tandem equipment. Experience in communications and screen based applications using COBOL is required. The company has its own in-house Tandem system providing training on their very popular equipment. Candidates must be presentable.

Contact Terry Harvey

'C' & Assembler Programmers

Rarely does the opportunity occur to join a company of this class. It has built an international reputation for its software products in Europe, USA and Japan. We would like to hear from graduates with a minimum of one year's experience who believe they can make a significant contribution using PDP/M68000 UNIX development systems.

Contact Terry Harvey

Wilts. c. £10,000

Rarely does the opportunity occur to join a company of this class. It has built an international reputation for its software products in Europe, USA and Japan. We would like to hear from graduates with a minimum of one year's experience who believe they can make a significant contribution using PDP/M68000 UNIX development systems.

Contact Terry Harvey

Support Specialists

Herts. to £13,000 + car

Due to continuing expansion this subsidiary of a major multinational corporation requires additional support specialists for their European support centre. Candidates must have a software background, a knowledge of communications protocols, a hardware appreciation and a good client contact manner. Candidates will most likely have had experience with a computer manufacturer or systems house.

Contact Brian Coates

Berks. to £12,000

A world leader in software packages including DBMS and sophisticated program development aids requires programmers to work on enhancing the company's capability in VME products. The work will require development and product support. Candidates should have experience with Pascal, or a similar language. This is an exciting opportunity to join a young team.

Contact Brian Coates

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Develop your career and your existing communications software skills by joining a company already firmly established in this high growth sector of the computer industry. We are seeking software people with experience in developing 3270 compatible systems and as much experience as possible in X.25 and L.A.N. products. Experience in C or PASCAL using M68000 and/or T1990 would be useful.

SYSTEMS AND PROGRAMMING

RPG II/III

PROJECT LEADER/IBM SYSTEM 38

To £14,000
One of the world's largest food chains require an experienced person to head a small development team, developing a wide range of interactive business systems. Preference will be given to candidates who can demonstrate leadership ability, and familiarity with design and programming methods gained in an IBM System 38 environment. The company offer an attractive salary together with good company benefits.

Ref. G 2393

SENIOR ANALYST/PROGRAMMER

Large manufacturing concern in South-West London require a Senior Analyst/Programmer to play a key role in their IBM System 38 development project. Having recently upgraded, an extensive background in IBM System 38/RPG II is essential, preferably coupled with some System 38 and/or MARS/PL/I experience. This is a pure development role, acting as second in command to the D.P.M., so you should be capable of liaising at all levels, and supervising where necessary.

IBM SYSTEM 34

KENT
To £12,000
A leading retail organisation are currently seeking an Analyst/Programmer with sound knowledge of RPG II, and with at least 18 months' experience of an IBM System 34 environment. In addition to good analytical skills, candidates should have a mature and responsible outlook. You will have major involvement in the implementation of a Stock control System and maintain ongoing systems.

Ref. G 2326

IBM COBOL

MOVE INTO ANALYSIS

WEST END £10,500 neg.

World-wide petrochemical group, running IBM 3031/3033 with MVS, CICS and DL/I seek an enthusiastic Analyst/Programmer to move into a pure analysis role. You should have 2-3 years D.P. experience with a background in IBM COBOL, CICS, DL/I, MVS and the ability to use both your technical and business skills to their full advantage. Benefits are excellent including, C.V. subsidised restaurant, life assurance, health care etc.

Ref. G 1578

PROGRAMMER/ANALYSTS

ESSEX £9,000

A leading manufacturing concern with a large IBM installation running under DOS/VSE, VM/LMS, CICS and DL/I require 2 pure Programmers with an IBM COBOL background and ideally database skills. A position of responsibility and the potential to move into analysis would be a distinct advantage. CICS training given where necessary.

Ref. G 1416

ANALYST/PROGRAMMER

CITY £12,500

International company involved with insurance and finance are seeking an Analyst/Programmer. Initially you will be involved with the defining and upgrading of a new system, thereafter working on any improvements to system design through to implementation. This is a good opportunity to improve your analytical skills. The company retain IBM 3300 mainframes running under DOS/VSE and VSAM. Benefits include 4 weeks holidays, P.L.V., S.I.L. and pension scheme.

Ref. G 2393

OTHERS

UNIVAC COBOL To £8,500

This well known financial corporation based in Kent is seeking for an Analyst/Programmer. It's location requires 18 months' UNIVAC mainframe COBOL. The company have a UNIVAC 1600 and use Oracle Database Systems. The majority of work development, and you will be trained as necessary on financial applications. The package includes three months' holiday and a subsidised training course (where appropriate). Ref. A 2477

Ref. A 1924

SYSTEMS ANALYST

SURREY £11,500 £1, Mort.

Large insurance company based in Surrey has an ICL 2980, and seeking an experienced Analyst with at least 4 years' sound D.P. experience. You will have spent the last two years' working in a Systems Analyst and must be able to demonstrate skills in the business area, either in pensions, insurance or the accounting sectors. A programme package would be a definite advantage and any machine banking system would be considered. Benefits include mortgage, salary retention scheme and subsidised car rental.

Ref. D 2452

PROGRAMMER

MIDDLESEX £NEGOTIABLE

With a minimum of 12 months ICL COBOL experience, you could be taking an exciting career move by joining this large insurance company, and receiving full training on the ICL 2980. Rare opportunity to enhance your career in ICL and train in TP systems. Full company benefits package including pension scheme, life assurance and subsidised restaurant.

Ref. D 2469

IBM PL/I

MIDDLESEX £NEGOTIABLE

Applications are invited from Analyst/Programmers with 4 years IBM PL/I experience, preferably in a commercial environment. The computer is an IBM 4331 running VM/CMS DOS/VSE in POWER and using CICS. All new developments are written PL/I using modular techniques. You will be mainly working with development of new systems, including product control, under strict, involving the. Excellent company benefits including Pension Scheme, have allowances and subsidised canteen.

Ref. D 23512

GRADUATES - ANY COBOL

To £9,500

This prestigious multi-national company utilises the latest technology to administer its manufacturing and commercial projects. To assist in furthering the development of its already highly automated systems an additional Programmer/Analyst is to be appointed. Ideal candidates should possess a degree and have a minimum of 18 months' solid IBM COBOL experience. You will be placed on the UNIVAC 1600, and the ability to work here systems design through to implementation. Good for further training with excellent career opportunities. Ref. A 1910

Ref. A 1910

BURDROCK - SENIOR

To £13,250

This information service organisation, based in the very heart of Burdrock, large mainframe technology, is currently seeking a Senior Programmer to head a team of 5. Such a position must have had a degree in Mathematics/Computer Science, preferably involving PL/I, GENCO, and CICS. A minimum of 4 years D.P. experience is essential. Applications are ideally quantitative data. Based in Surrey, this site is easily accessible by road or public transport. A generous salary is offered and the benefits include life assurance, 5 weeks' holiday and a relocation package. Ref. A 2024

Ref. A 1910

BASIC & AIMS: COBOL

£NEG

My client a major financial institution based in the centre of London, is due to expand, seeking all levels of P.C./D.P. expertise from programmers to analysts. The initial main concern has a high degree of development work, mainly in Business Applications. Exposure to RSX-11M is essential. You will be required to do at least 1 of the following: BASIC, AIMS, COBOL. The package includes profit share, one month's free pension, P.P.P. and mortgage subsidising. Please now for further details. Ref. A 2020

Ref. D 2501

ENGELDOWNS ASSOCIATES
Computer Personnel Consultants
01-247 3356 (24 hrs)
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Stevenage Borough Council

Applications are invited from men and women for the following posts:

DEPARTMENT OF FINANCIAL SERVICES

Senior Programmer

Ref. G 24621

ANALYST/PROGRAMMER

To £13,000

One of the most reputable City software houses, specialising in IBM System 38/PGP II experience, to work on site, on a variety of insurance and financial development projects. They also seek an experienced Systems Analyst, conducting feasibility studies and implementing bespoke and tailor-made systems. For this position, any machine background would be acceptable if you have the drive and ambition to succeed.

Ref. C 1130

PROGRAMMERS AND ANALYSTS

£8-£12,000

Small, young and dynamic software house in north west London are

seeking a Programmer with 12 months' IBM System 38/PGP II experience, to work on site, on a variety of insurance and financial development

projects. They also seek an experienced Systems Analyst, conducting feasibility

studies and implementing bespoke and tailor-made systems. For this

position, any machine background would be acceptable if you have the

drive and ambition to succeed.

Ref. C 1130

ANALYST/PROGRAMMER

To £13,000

One of the most reputable City software houses, specialising in IBM

System 38 financial systems, seeks a bright young graduate, with 2-5

years' RPG II/III experience, for an Analyst/Programmer role. This is a well

established, stable, and professional company seeking the best people

and offering some of the best perks in town. All of their clients are within

a mile of their base offices.

Ref. C 1130

ANALYST/PROGRAMMER

£9-£12,000

A reputed financial concern based in the city, with clients in the financial

sector who are based within one mile radius of their offices seek additional

established, stable, and professional company seeking the best people

and offering some of the best perks in town. All of their clients are within

a mile of their base offices.

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sector who are based within one mile radius of their offices seek additional

established, stable, and professional company seeking

Logos Recruitment Limited
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Telephone 01-373 3063

Signal Processing

London & S Home Counties: Salaries to £14K

Our client, one of the leading UK Systems and Software Houses, has a number of vacancies for Signal Processing Specialists to join either the Central London or Surrey based offices. Applicants should be graduates in a scientific discipline and have subsequently gained at least two years' experience in an industrial or defence environment developing software for signal processing applications. Those who have current or very recent experience with Floating Point Systems array processors are particularly encouraged to apply. In addition to possessing the technical skills outlined above, successful applicants will also be expected to be personally presentable since you will be involved in a significant degree of client contact.

Ref: L/23/A

Communications Consultants

Inner London: Salaries to £16K

A highly regarded Systems House is seeking several Senior Communications Consultants for its London Headquarters. Ideally applicants should have a minimum of 3 years' experience in a related field and be educated to at least a H.N.C. standard. You will be expected to have a thorough knowledge of at least two of the following communications protocols: X.25, SDLC/HDLC and BSC standards; office automation systems.

Real-Time Programmers

Central London: Salaries to £10K

Graduates with at least eighteen months' industrial experience are required to join the Development Group of a London-based Systems and Software House. As a result of several recently won contracts they have vacancies in a number of different applications areas. All applicants should have worked in a real-time, on-line environment where there is a considerable bias towards systems development. Preferences will be shown to those able to combine fluency in Assembler and a high-level language such as Pascal or RT11/2, with a knowledge of any leading mini- or micro-computer. Applications areas of interest will include one or more of the following: Process Control, Communications, Guided Weapon Systems and Electronic Publishing.

Ref: L/23/C

IBM Database Designers

London & Thames Valley: Salaries to £16K

A leading Information Systems Contractor has a number of vacancies for IBM Database Designers and Systems Engineers for its Central London and Thames Valley locations. All candidates must hold a minimum of two years' IBM (or a Plug Compatible Manufacturer) systems engineering experience. Of paramount importance to our client are those who have current systems engineering experience with MVS, IMS, SNA or CICS.

Ref: L/23/D

RSX-11 Systems Progs

London & H. Counties: Salaries to £13K

The Communications Division of a leading Systems Supplier and Consultancy is currently seeking additional Systems Programmers. Suitable applicants should be graduates with a minimum of two years' software systems design experience within PDP11/RSX-11M or VAX/VMS environment. It is essential that you should offer fluency in Assembler and that you are fully familiar with the internals of RSX-11M or VMS.

Ref: L/23/E

C & UNIX Programmers

London: Salaries to £10K

A highly respected Product Supplier is currently seeking to recruit several Systems and Applications Programmers to work on its UNIX-based range of products. Applicants, aged 22-26 years, should have graduated since 1980 with a good class honours degree in a numerate subject and have at least one year's commercial or industrial experience. Very recent M.Sc. or Ph.D. candidates are also encouraged to apply particularly if their

Ref: L/23/F

Knowledge Engineering

Thames Valley: Salaries to £14K

Our Client's Research Centre, established in 1978, has recently taken additional premises in the Reading area. An immediate requirement exists for personnel to participate in the development of the Company's range of products and services. You are probably engaged as a Systems Programmer, Designer or Consultant and have a minimum of a B.Sc. degree to a numerate published. Those who hold an M.Sc. or Ph.D. are encouraged to apply if they can combine an academic background with some relevant industrial or commercial experience.

Ref: L/23/G

Micro S/W Development

Cambridge: Salaries to £12K

Programmers and Software Team Leaders are urgently required to assist in the development of applicative and systems software for a new generation of microcomputers. Successful candidates for the positions of Team Leader will be fluent in a high-level block-structured language and have specified and implemented at least one compiler. Working in-house, their responsibilities will include the design, development and commissioning of systems software and the evaluation of commercial packages submitted by sub-contractors. Programmers will also be expected to offer fluency in a block-structured language and, preferably, have gained experience on micro-based systems. High standards of documentation are required of all respondents who, in return, will be rewarded by highly competitive salaries and a dynamic working environment.

Ref: L/23/H

SYSTEMS DESIGN ENGINEER

South Coast
Will be responsible for research and development in new signal processing techniques, particularly as applied to Modem and Control Systems. A good honours degree or PhD. Applicable to modern signal processing is required along with a minimum of five years' relevant experience.

DLM 23/1

SOFTWARE DESIGNERS

West London
Our client requires Development Engineers to design and implement Software for a Multi-microprocessor Military System. They will design and test, and be using, an Emulator and Cross Assembler running on a Vax machine. Candidates should have a degree and at least three years' assembler language on DEC machines in a defence environment.

DLM 23/3

SOFTWARE ENGINEERS

South Coast
Our client requires Engineers to plan and prepare Software Programmes for Military Microprocessor Digital Message Switching Based Communication and Speech Processing Equipment. A degree is needed, and an experience of software preparation for M6800/68000. Experience of Pascal, Basic or Fortran is essential.

DLM 23/4

HARDWARE ENGINEERS

Surrey
A major Systems House specialising in defence systems have a number of openings for Engineers with one or more of the following skills: Building Microprocessor Systems, Floating Point Systems, Digital Electronic Engineering, and Fault Analysis.

DLM 23/8

OPERATIONAL ANALYSIS

London and Surrey
One of the largest International Software Houses, has a number of openings at all levels, for graduates with experience in the Operational Analysis field. Candidates with experience of Defence Systems will enjoy a progressive professional career path.

DLM 23/7

SOFTWARE DESIGNERS

West Country
The centre of Advanced Spinor Technology is looking for degree qualified people, able to develop detailed software design concepts and to lead technically, a team of implementation Programmers.

DLM 23/8

SENIOR PROGRAMMER

Surrey
A major defence contractor requires a Senior Programmer to produce, test and support software on a VAX 11/780 to support the development of Microprocessor based software. Candidates should hold a degree or HND/HNC in a related subject, and experience of 8086 Assembler, knowledge of VAX/VMS and Corel 68.

DLM 23/10

HARDWARE ENGINEERS

Middlesex
The Radar Division of an International Electronic Manufacturer is strengthening their New Product Development Team. Engineers are required to develop new digital hardware for high speed processing of Real Time Signals. A minimum of three years' Logic Design plus a degree is needed and an EMC background would be helpful.

DLM 23/11

SENIOR SOFTWARE ENGINEER

Bedfordshire
A degree, plus a minimum of three years' experience in Real-Time development at Assembler level, design is required. High-level language experience in Pascal, Coral, BCPL when applied to micro-based systems would also be useful.

DLM 23/12

SOFTWARE ENGINEERS

Wiltshire
A major International Telecommunications Company requires engineers educated to degree standard, with at least two years' experience of Coral. Familiarity with the use of CPM, Intel MDS or application concerned with Man-Machine Interface would be advantageous.

DLM 23/13

SOFTWARE ENGINEERS

Switzerland
A major telecommunications company seek additional Programmers to work on state-of-the-art switching systems. Candidates should have a degree, be in their twenties and have experience in some of the following: real-time multi-micro processor operating systems, domains, devices, HDLC, high or low level protocols, e.g. Assembler, C, Pascal, SPC switching systems, call handling experience, CO/IT recommendations, System 12/40 and System X.

DLM 23/14

GRAPHICS

West Country/Yorkshire
A London-based Software House is currently seeking Scientific Programmers to work on site in the West Country or Yorkshire for a minimum of two years. Candidates should have experience of FORTRAN, C, assembly language and graphics techniques in real-time applications. In addition, Programmers will be required to maintain and support existing software packages.

DLM 23/15

COMMAND & CONTROL

London
One of the world's leading defence contractors is seeking a number of Software Engineers with their headquarters in London. They have a minimum of one year's experience in Real-Time systems and software development. Candidates should be fluent in Pascal, C, BCPL, and INTEL 8086.

DLM 23/16

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Data Matics, Farnham, Surrey KT6 5PR

Ref: L/23/I

Ref: L/23/J

Communications Manager

A Key New Appointment

Rural Sussex **C.£20,000 plus substantial fringe benefits**

For a major force in the financial sector with a multi-million pound investment in its communications services.

As the senior Communications professional within the organisation, the Communications Manager will have prime responsibility for the design, development, implementation and effective functioning of an integrated communications network and for the management of the communications section. The position carries budgetary authority for communications lines, equipment and associated services.

The requirement is for substantial overall technical competence in the major areas of current communications technology, data, voice and text, with demonstrable experience of designing and implementing cost effective integrated networking facilities. It is likely that the successful candidate will have held a senior communications management position within a large organisation and will have played a significant strategic role in long term network planning. Minimum age indicator is around 30.

To apply, please send a CV or write or telephone for a Personal and Professional History Form, to JOHN KITCHEN, at the address below, quoting Ref. GC1133.

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York House, 199 Westminster Bridge Road
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Telephone 01-633 0866



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Insurance Banking London, H. Counties, N. Eng

to £12K
London

COBOL/PL1/OS/CICS/IMS **to £13K**
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to £16K
Real-time, Modelling

ICL/ON-LINE EXP **to £12K**
COBOL Surrey

to £15K
London/Surrey/Manchester

HONEYWELL **to £12K**
Systems Programming experience Middlesex, London

to £16K
Middlesex

DATA GENERAL ECLIPSE **to £11K**
Cobol Leicestershire

to £16K
Leicestershire

IBM/RPG2 **to £12K**
Financial/Insurance Home Counties

to £13K
Surrey

IBM **to £16K**
Systems exp. Essex

to £15K
Essex

BASIC **to £11K**
Mini Computer London

to £13K
London

IBM/UNIVAC/COBOL **to £12K**
On-line/Database Surrey

to £15K
Surrey

NCR 8200 **to £14K**
Financial SW London

to £14K
Surrey

MILITARY SYSTEMS/RADAR **to £14K**
Coral - Marconi Hants/Surrey/Essex/S. West

to £14K
Hants/Surrey/Essex/S. West

Analyst/Progs

BURROUGHS/COBOL **to £14K**
Commercial Surrey

to £14K
E. Anglia

IBM 34/38/4341 **to £15K**
London/Home Counties/North

to £12K
Home Counties

MICRON MICROS **to £16K**
Manufacturing/Production Control Surrey

to £15K
London

IBM/GPSS **experience essential to £16K**
Simulation Holland

to £15K
Holland

TERMINAL EMULATORS **to £15K**
C/Assembler London

to £15K
London

Snr Appointments

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UK & Overseas

CONSULTANT **to £15K**
Military/Defence

to £15K
Hants

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Digital/RTS/E, BASIC Guds

to £15K
Guds

TEAM MANAGER **to £17K**
Computer Modelling/Fluid Flow S. London

to £17K
S. London

PROJECT ENGINEER **to £11K**
Systems/DEC Beds/Middlesex

to £11K
Beds/Middlesex

ENGINEERS **to £15K**
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PRODUCT APPLICATIONS ENGINEER COMPUTER PERIPHERALS

Middlesex

c £10,000

Newbury Data Recording Limited, Europe's leading computer peripheral manufacturer, has a large expanding order book which includes many multi-million pound contracts. Our expanding range of products includes dot matrix printers, made for demanding customers who increasingly require specialist applications.

We have a vacancy for a Product Applications Engineer with complete responsibility for modifying printer software to customers' requirements. This challenging position offers active involvement in obtaining business for the Company and the satisfaction of seeing your ideas through to production. Responsibility for customer visits, project assessments, design and documentation, development, and testing will involve constant liaison with customers, marketing, engineering and production.

Probably from a design engineering background, the successful applicant will have several years experience of INTEL software, PLM or other level languages.

Experience on INTEL network would be an advantage.

To apply please write to I.A. Mifflin, Personnel Officer,

NEWBURY DATA RECORDING LIMITED,

1100 Horne Road, The Causeway, Staines, Middlesex,

or telephone Staines 51388 Ext. 239 for an application form.

Newbury Data

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SOFTWARE EVALUATION AND SUPPORT

SALARY CIRCA £14,000

Star Computer Group PLC, well known as the major supplier of Mini systems to the accountancy profession, have introduced 'The Star Partnership' an exciting new way to distribute microcomputers.

We are now seeking another person to join our small enthusiastic micro team to help with the evaluation and support of different software packages.

Ideally candidates should have experience of well-known micro products such as D Base II, Wordstar, Visicalc, etc, combined with sufficient accountancy knowledge to understand the relative merits of different commercial software. The job will involve communicating product details by telephone and correspondence, arranging software demonstrations as well as testing software.

Applicants should send written details to Ian Williams, Star Computer Group PLC, 84 Great Eastern Street, London EC2A 3QR.

(4088)

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Task Force would like to hear from computer professionals with the following skills:

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Permanent positions to include company car, expenses, BUPA etc.

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Stoke-on-Trent

(0782) 410217/8

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Essex SS1 2NE

Telex 656042

Telephone

Southend

(0702) 615651/2

GRAMPIAN REGIONAL COUNCIL COMPUTER OPERATOR

Ref. 338/83CW. Required at Aberdeen College of Commerce. Applications should be experienced. Experience of operating VAX II/780 and PDP/11 equipment an advantage although training will be given. Some data preparation required. Hours of duty include evenings for which an allowance is paid. Salary scale £5,362 to £6,682.

Application forms and further details from Director of Manpower Services, Woodhill House, Aberdeen AB1 2LU.

Closing date June 22.

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Project Manager Analysts Programmers Operations Controller

IBM S38

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A Genuine Opportunity
to advance your skills

Pall Europe Limited are world leaders in the manufacture of high quality fine filtration.

The Company wishes to strengthen its IBM SYSTEM 38 computer function by recruiting additional, ambitious people with RPGII/RPGIII experience.

This is an excellent opportunity to join a creative team working on advanced data base systems including MAAPICS.

Salary is negotiable and will reflect the importance of these positions.

Write to or telephone: M. J. Bartlett,

Personnel Manager,
Pall Europe Corporate Services Limited,
Walton Road, Farlington, Portsmouth,
Hants PO6 1TD.
Tel: Cosham (0705) 370901

(4072)

CHELSEA COLLEGE
University of London
The Microcomputer Systems Laboratory at the College Computing Centre offers an advisory service to staff and students on applications of modern microprocessors and microcomputer hardware and software.

Applications are invited for the following posts:

1. MICROPROCESSOR
ENGINEER

which is largely concerned with the hardware aspects of the work of the laboratory.

2. MICROPROCESSOR
ANALYST/PROGRAMMER

which is largely concerned with the software aspects.

Both appointments are offered on the salary scale £2,304-£2,832 inclusive of £1,150 London Allowance. Starting salary will be dependent on age, qualifications and experience. Applications for both posts should be sent to the Personnel Officer, Chelsea College, 833 King's Road, London SW10 6UA. Closing date: 26th June, 1983.

(3084)

HOME COMPUTER PROGRAMMERS

The division of the leading Software Development Company is looking for a new generation of 'cutting edge' computer professionals to join its rapidly growing and dynamic team.

They are looking for people with top quality programming in BASIC, PASCAL, C, COBOL, FORTRAN, and other languages.

They are looking for people with a good understanding of computer architecture and applications. If you are a highly skilled and experienced computer professional, then you could be the person we are looking for.

For further details contact the Personnel Officer, Chelsea College, 833 King's Road, London SW10 6UA. Closing date: 26th June, 1983.

(3084)

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USA IDMS PROGRAMMERS COBOL

Preferably IBM

Would consider ICL
Telephone Marilyn Davidson
on 01-838 6775

Computer Personnel International Ltd.
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(4072)

BURROUGHS PROGRAMMER/ANALYSTS

WINDSOR & LEICESTER £13,000 + CAR +
RELOCATION

We are a well-established software house with offices in Windsor/Slough and Leicester, and we are currently looking to recruit experienced programmer/analysts to work with small computer systems on a variety of projects.

Candidates must be working in a programmer/analyst capacity and be capable of dealing with the specification of production control and order processing systems for mini computers, although the prime involvement will be in a programming capacity.

Candidates should have at least five years' commercial analysis and COBOL programming experience on real-time mini or micro computers, preferably on Burroughs CMS range of machines (890, 8900, B1900).

Candidates must be self-motivated, capable of dealing directly with customers at all levels (non-computer staff) and will be able to work in a dynamic environment.

Opportunities are available to progress into a variety of areas including involvement with a range of micro computer equipment and specialist terminals.

A good salary, including relocation expenses where relevant, would ensure that the successful candidates can exceed their current remuneration level.

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Having moved ahead of their competitors in Fourth Generation technology, they are currently seeking career minded individuals to become involved in the development of new products.

Opportunities exist at both senior and junior levels.

You must have good educational background, at least two years' experience ideally with skills in either systems or application programming and/or analysis acquired in a mini/mainframe environment.

Their flexible attitude towards remuneration and responsibility and an expanding organisation that encourages innovation and flair, will enable you to move ahead of your own competition in the rapidly changing world of computing.

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(4007)



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To run smoothly and timely, operating schedules will assume responsibility for managing one of three shift teams, liaising closely with the system software function and departing for the Client Operator where necessary.

Senior Shift Leader
Sperry Univac 1100 Series
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With at least 5 years' total operating experience (2nd shift leader or similar level) you must have extensive knowledge of Sperry Univac 1100 Series.

The package includes such outstanding benefits as:

- Generous shift allowance
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PROGRAMMERS... SENIOR PROGRAMMERS... ANALYST PROGRAMMERS

On-Line Development ICL 2900 DEC VAX

We are an expanding medium-sized insurance company with our computer function based at Croydon. As we are in the process of developing new systems, we can offer interesting work to experienced and enthusiastic D.P. staff.

We operate two ICL 2900 mainframes (under VME and DME) and can promise you exciting involvement in developments centred around DEC VAX 11/780 computers supported by about 100 terminal devices on full implementation. Micro-computer development, both stand alone and linked to our mainframes, is an ever-growing feature of our programme and one in the Management Services Department is integrally involved.</p

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URGENT!!
Micro Basic Programmer Analysts & Programmers

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DEC RSTS/E BASIC + 2

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IBM CICS/DL1, JSP

IBM DL1 CICS CICS

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Duality Assurance Analyst

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OPERATIONS 0252 516141

ICL GII Operators with VMEB, Immediate start, long term

IBM System 3 Ops for London, long term

Contact: ALAN PAIN

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Assembler, Pascal, C to £11,000 pa

My client is rapidly becoming one of the market leaders in the challenging field of micro-computer systems. Significant future growth will involve the enhancement of the design and development capability to meet the requirements of the next generation of products.

The company has recently moved to purpose built premises, located in a semi-rural/coastal area. Housing in the vicinity is low priced and attractive.

Applicants should be degree qualified and have a minimum of two years experience of application software on micro based equipment programming in ASSEMBLER, C, PASCAL or a similar high level language. Current projects are based on a variety of microprocessors including 6809, 68008 and 8088.

Career opportunities are outstanding and the excellent benefits package will include comprehensive relocation assistance where appropriate.

Please apply providing a full C.V. to Barrie Wilt by writing to the address below. Further information or an application form can be obtained by telephoning him on:

0905 611512 during office hours or 06845 66477 evenings and weekends.

Computer Personnel & Executive Development Associates Ltd, Old Bank House, Bank Street, Worcester WR1 2EW.



RPG2/RPG3 IBM SYSTEM 38

West Country

Technically skilled and personable people are immediately required for development work involving considerable user contact.

Applications are of a financial and commercial nature, and the Company is committed to the full utilisation of computer systems.

Initial interviews will be held in LONDON, BIRMINGHAM and BIRMINGHAM with full travel expenses paid. Full details of the Company, the Computer Services Department, the Applications, housing and education in the area will be given to each applicant at the interview.

For information and interview, telephone in confidence to Digby Dyke, Managing Director (evening charges if necessary) on:

0905 611512 office hours
06845 2210 evenings/weekends

or write with C.V. or request for an application form to:

FREEPOST, Computer Personnel & Executive Development Associates Ltd., Old Bank House, Bonk Street, Worcester WR1 1BR



Salaries to £11K
Generous Relocation Assistance

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Engineering Timesharing Support

A team of people is required to provide technical engineering applications support and software development services to a large population of engineering users throughout the Midlands, of an internal Engineering Timesharing service. The service will be both FORTRAN and ASSEMBLER based, using either MVS/TSO or VMS/TSO. It will have access to a range of external vendor packages for graphics and structural analysis. The group will also be responsible for installing, maintaining and supporting the use of the external vendor software. Two people are required with 1+ years experience of using FORTRAN on IBM mainframes using timesharing and batch in an engineering/scientific environment. Experience of IBM TSO and JCL is essential. Also people with 1+ years experience of using structural analysis (Finite Element) software in a mechanical engineering environment. Experience of IBM MVS/TSO and JCL is essential. Experience of MASTRAN or SORC SUPERTRANS/SUPERTRANSYS is desirable.

Please send or telephone your application in confidence to Digby Dyke, Managing Director, as below.

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SAUDI ARABIA

SENIOR ANALYST PROGRAMMER £18,000 (TAX FREE + BENEFITS)

Our client, a progressive Transportation Group, requires a computer professional to control computer systems and operations on an ICL ME 29 using COBOL and IDMS. Current developments include on-line container and cargo handling systems.

Benefits include free accommodation, transport, local living allowance and three paid air fare leaves to U.K. Single status post. For further details of this attractive position and the generous package of benefits, telephone or write to Alan Daly.

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Tel: 041-221 4168 (24 hours)

Royal Military College of Science

Associate Professor of Computing Science

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to take overall responsibility for the affairs of the association

The person appointed must be experienced in the fields of marketing, public relations and general management. Experience of the UK videotext and teletext industries would be an advantage

Salary in the range of £12K-£15K plus an incentive bonus scheme

Applications to:
Mrs Ann Canavan
VIDEOTEX INDUSTRY ASSOCIATION
1-4 Langley Court, Long Acre
London WC2E 9JY

Finance Department

Analyst/Programmer up to £8,300 (salary award pending)

Applications are invited from persons with at least two years' programming experience using COBOL in an ICL installation.

The Council's computer equipment consists of an ME 29/37 with extensive on-line cash receipting and video networks.

Generous relocation, expenses and housing (subject to availability).

For application form, write to: The Personnel Officer, Council Offices, Fleet, Hants, GU13 8AE. Or telephone: Mr. Martin or Mrs. Cadge, Fleet 2212, extension 208.

CLOSING DATE: June 24, 1983

Call me Vincent Melling now on 01-8441 - for further details. (4040)

ABERDEEN COMPUTER STAFF LTD

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"A rare opportunity to join one of the most progressive computer installations in the UK today, where your contribution will be recognised and rewarded with excellent career prospects."

Our Clients, an extremely successful Group of Companies, have, over the last ten years risen with confidence and acclaim to become the market leader in their field of financial services.

Complacency is not a word they recognise and the Group continues to expand at a breathtaking pace.

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The current configuration centres on an IBM 3081G, with a 3 mb 3031 for Systems Programming, laser printers, 8100's and 3780 telephone exchange. Software is varied but includes MVS/SP 1.3, ACF/VTAM, IMS/VIS 1.2, TSO, APL, ROSCOE, and SAS.

Forward planning has identified a need to recruit skilled computer professionals to work within the User Support Group and a number of Operational Analysts are required. The User Support Group's activities are important and far reaching with involvement in both project orientated tasks and on going installation responsibilities. This latter area includes providing input on operational problems, testing and production JCL, efficiency of systems facilities and ensuring the operational influence on new applications.

Applicants must obviously be well versed in IBM operations support activities and possess a good JCL background, and whilst experienced Ops Analysts are preferred, consideration will extend to those wishing to move into this role. A possibility may exist for a highly experienced individual to assume a more senior role.

An excellent range of benefits will accompany the salary, including relocation assistance, non contributory pension scheme, BUPA and profit sharing.

For an informative and confidential interview contact the Advising Consultant Martin Stainthorpe on 021-238 3781 (24 hour answering service) or at home on 021-744 1862 (Evenings and Weekends 7-9pm).

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We have been retained by a major trading group who have established a company to service the ever-increasing information processing needs of its community, in particular the banks.

Contracts are renewable two yearly. Free furnished accommodation will be provided in line with marital status. In addition to local holidays 30 days overseas leave is provided. At the end of each 12 month period a return excursion air fare paid, is also included plus company car according to status.

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£10K basic: on target earnings £30K TAX FREE

Aged 26/35 with international banking experience, demonstrable track record in selling Bursa/Brussels products and software to banks. Familiarity with BISCO/BISCO and all banking terminals and document processors.

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£14K basic: on target earnings £25K TAX FREE

Aged 26/35 with three years' of successful sales experience of CMS, B20 and knowledge of B1900.

For further information please contact Kathy Sinclair on 01-637 9611.

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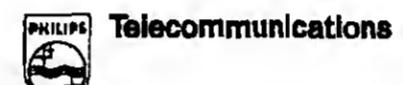
We are seeking a revolutionary new CAD approach in the area of VLSI technology and imaginative people who will help us sweep away obsolete methods and ideas.

At TMC we're evolving more than just new tools. We're into a total rethink of our approach, as we move forward from LSI to VLSI design. If a radical, uncompromising attack on the problem appeals to you and you have the potential to learn and contribute to it, this could be your big personal breakthrough.

TMC Limited is a division of Philips Business Systems and a leader in the design and manufacture of advanced telecoms equipment. Our CAD group provides design tools for LSI and thick film hybrid circuits, and is now making the move forward into VLSI.

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How about You?
You'll be in your twenties, male or female,



with a degree in electronic engineering or computer science. The sort of post-graduate experience we're looking for is 1-2 years' in any of the following:

Circuit simulators – analogue and digital. Verification and design rule checking. Interactive graphics. MOS layout software – automatic design or silicon compilers, or symbolic editors and compactors.

Alternatively, if you've had software experience of at least 1 year in a scientific environment we shall be glad to talk to you.

Call us today.

Starting salaries will be tailored to your abilities and potential in the £8,000 – £10,000 bracket, with 25 days' annual leave, PPP at group rates and other benefits include relocation assistance if required. We're at Malmesbury in beautiful Wiltshire, a small, unpoluted town in attractive country with good road/rail links.

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PHILIPS

Programmer

COBOL:DEC VAX/PDP II c.28500 p.a.
We are a developing company in the independent health-care field, with six hospitals operational in the UK, and another due to be opened in the summer of 1984.

Computer operations are centred in our West End offices and recent growth, together with an upgrading of equipment provides a good opportunity for a keen programmer to develop excellent all-round skills. Ideally, applicants will have around two years experience, be familiar with DEC equipment, be self-motivated, ambitious and aged probably around 25 years.

Fringe benefits include life insurance, pension plan, health insurance, season ticket loan, etc. Please write or telephone for an application form, or alternatively send your C.V. to:

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London W1H 8LE
Tel: 01-835 7185

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Post Ref. No. BC5/0-83
DEPARTMENT OF BUSINESS AND COMPUTER STUDIES

LECTURER II IN COMPUTER SCIENCE

Required for September 1983 or as soon as possible thereafter.

The person appointed should have a knowledge of COBOL and BASIC Programming and will be expected to teach on the City and Guilds 746/747, BECTEC Computer Studies, DEC Higher and BSC National Data Processing Option Modules and OCE 'A' Level Computer Science. An ability to teach Micro-computer applications would be an advantage. Applicants should be suitably qualified and teaching/commercial experience desirable.

Salary scale: £9,828 – £11,022 plus £300 Inner London Allowance.

Application form and further details obtainable from the Principal's office, Wandsworth High Street, London SW18 2PP. Please quote post reference number.

IEA is an equal opportunities employer.

DEC PROGRAMMERS

Required immediately. Commercial applications. Experience in RSTS/E, BASIC+2, RMS, FMS11 essential.

Knowledge of DEC RPL 11 an advantage. Preferred age 23+.

Salary negotiable.

Apply to: H. Reporter
(Managing Director),
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Sutton Coldfield, West
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Tel: 021-352 0011

TORBAY HEALTH AUTHORITY Newton Abbot Hospital – District Treasurer's Department

Technical Officer

(Computing and Systems) (Ref. DT30)
Salary Scale £7,404-£9,025 per annum

The person appointed will be responsible to the Assistant Treasurer for the day-to-day operation and security of the microcomputer installations within the Department, and will play a major role in the evaluation, implementation, and development of further local computer systems.

Candidates should be capable of working on their own initiative and have a sound knowledge of computer installations and/or computer programming.

Application forms and job descriptions, which can be obtained from the above office situated at 62-64 East Street, Newton Abbot (Tel: Newton Abbot 4321 ext. 208) must be returned by first post 20th June, 1983.

140561

BRISTOL for jobs

PROGRAMMER

Up to £9,231

The AVON and BRISTOL COMPUTER UNIT, one of the largest in the area, serving the County of Avon and the City of Bristol, needs a programmer.

The Unit is committed to an intensive programme of development in areas of Management Information, Accounting, Payroll, Personnel, Education, Housing, Programming and Social Services, supported by an SMB, IBM 4341, CMC and Wang micro-computers with an expanding network of online devices and micro-computers.

Opportunities are available for staff to develop their careers in a dynamic organisation. Staff are employed as Systems Officers and may participate in all stages of the development and support of systems, as well as developing expertise to a high level in particular areas.

Applicants must have at least one year's experience and should be proficient in PL/I. Appointments will be made at a salary appropriate to experience and qualifications.

For further information and an application form, please telephone Bristol (0272) 26031, ext. 247; quoting reference CU 972. Or write to: Director of Personnel, The Council House, College Green, Bristol BS1 5TR.

Applications returnable by June 24th, 1983.

UNIVERSITY OF BRISTOL

Computer Science Department

RESEARCH ASSISTANT DISTRIBUTED DATABASES

Applications are invited for a Research Assistant to join an SERC-supported contract associated with the PROTEUS distributed database project.

Candidates will be required to assist in the development and testing of an integrated network of relational databases which currently involves three distinct DBMS, running on a large number of micro-computers and a mainframe computer. This network is a subset of the Proteus project, in which seven University research groups are collaborating to develop a heterogeneous distributed database, and there will be opportunities to take part in the development of various sub-project groups.

Applicants should have research or industrial experience in Computer Science and be familiar with the principles of relational database systems. Experience of one or more of INGRES, MIDS, UNIS, MULTICS, C would be particularly welcome. The application is for a fixed period of two years, commencing in September 1983, or as soon as possible thereafter. Salary will be in the range £8,000-£8,516 p.a. with the initial point determined by experience.

Further particulars may be obtained from Dr. J. R. Oliver, Computer Sciences Department, Bristol University, University of Bristol, Bristol, BS8 1TW, or with curriculum vitae and names of two referees, by June 17th, 1983.

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OWNERS ABROAD, a leading tour operator in the holiday industry, are undergoing a period of rapid expansion and seek to augment their brand new Computing facilities in Northolt. Based on Parkin Elmer 3210 & 3230 the following staff are required:

**ANALYST Database & TP experience to £14K
PROGRAMMER Fortran experience preferred to £11K
OPERATOR 6 months' minimum experience to £6K**

We would also be interested in hearing from Programmers with Mumps experience for other positions within the group. These are excellent ground floor opportunities within a young and dynamic company.

Please telephone 01-567 9184, or send in a detailed c.v., quoting the job for which you are applying.

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SYSTEMS AND PROGRAMMING

TANDEM PROGRAMMER

LONDON £10,000
Financial organisation based in the City wish to recruit an experienced TANDEM Programmer to work in a progressive environment as part of a newly formed team. The position carries considerable benefits and a competitive salary is offered to the right individual. G.7112

BURROUGHS PROGRAMMER

LONDON £8,000-£9,000
Prestigious West End company is looking for experienced Burroughs people fully conversant with DMS II. Excellent company benefits include BUPA, interest-free season ticket loan and contributory pension. G.7182

ICL SYSTEMS ANALYST

SURREY £10,000-£11,000
A systems analyst with at least four years' experience is sought by this organisation. Sound knowledge of pension systems would be a distinct advantage however applicants with a financial, accounting background would be considered. G.7261

SYSTEMS ANALYST

LONDON £11,500-£13,500
A progressive commercial bureau is seeking an experienced systems analyst to take a leading role within the organisation. A minimum of two years' DP will at least two as a systems analyst, with experience of either bureau, software house or Burroughs hardware will give the successful applicant a competitive salary and demanding but rewarding position. G.7265

IBM ANALYST/PROGRAMMERS

MIDDLESEX £12,000
A well-known publishing company are looking for people to join a small friendly development team. Two-four years' PL1 programming/analysis experience is required, however, candidates with a very good programming background who want to further their career in analysis, will be considered. Most new projects are developed using the current on-line system. System uses VM/CMS, DOS/VSE, Power and CICS. R.7267

IBM SYSTEMS ANALYSTS

LONDON/HOME COUNTIES UP TO £16,000
We have a number of clients, from the world of banking, insurance and commerce seeking analysts with good sound experience in their particular field. Vacancies range from programmers who want to move into analysis up to senior systems analyst/project leaders. Knowledge of any of the following is desirable - COBOL, PL/I, RPG II and III, CICS, DL1, DATABASE. G.726

ANALYST/PROGRAMMERS

LONDON £NEG
City based software house seeks analyst/programmer with experience of Database design using IBM DOS, CICS, DL1 and/or NCR, VRX, TOTAL, TRANSPRO with COBOL. International banking experience is desirable. Salary dependent upon experience. R.7380

SYSTEM 38

MIDDLESEX £12,000
Opportunity for a technical programmer and systems analyst on a System 38 in a growing young insurance company. Experience in insurance and/or retail applications is desirable but not essential. System 38 experience is not necessary for the systems analyst position. R.7343

DEC VAX/PDP PERSONNEL

LONDON & HOME COUNTIES £6,000-£13,000
A variety of positions currently exist for people with a minimum of two years' DEC experience using either BASIC, FORTRAN, COBOL or MACRO 11. Here are just some of the vacancies.
VAX ANALYST/PROGRAMMERS COBOL LONDON
PDP PROGRAMMER MACRO 11 SURREY
VAX/PDP PROGRAMMERS BASIC SURREY
PDP ANALYST/PROGRAMMER FORTRAN MIDDUX
DEC PROGRAMMER COBOL LONDON J.GEN

PRIME ANALYSTS/PROGRAMMERS

MIDDLESEX £NEG
Two analysts/programmers with a minimum of one year's FORTRAN experience are being sought by this well-known company. These positions would suit young people with a background in scientific applications who are keen to develop their experience on scientific information systems. J.7341

VAX PROGRAMMER

EAST SUSSEX £8,000
An experienced programmer is required to join a small development team who are working on a variety of commercial applications. Candidates should have a minimum of two years' programming experience in BASIC, however applicants who possess a strong programming aptitude in any language will be considered. An attractive set of benefits are available with this position after various qualifying periods. J.7385

FOR FURTHER INFORMATION, PLEASE TELEPHONE 01-439 7871

OPERATIONS

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ICL ME29 OPERATOR	£6,000	SURREY		HP SHIFT LEADER	c. £7,500	BERKSHIRE	3 YEARS
ME29 SNR OP	£6,500	LONDON		OPS MGR.	£12,500	BERKS	10 YRS. OOS/VIS
2900 VME OP	£NEG + BONUS	BERKS		SEN OP	£10,000	LONDON	3 YRS. MVS JES
VME/B NETWORK TEC.	£10,000	MIDDLESEX		OPERATOR	£8,500	KENT	3 YRS OS/DOS
			2 YEARS	OPERATOR	£7,000	W. LONDON	18 MTHS
DEC NETWORK ASST/CONT	£8,000 + 10%	WALES	2 YEARS	OPERATOR	£6,500	SURREY	0OS/VSE
OPERATOR	£7,000	SURREY	18 MONTHS	OPS SUPPORT	£10,000	SCOTLAND	1 YR DOS/VSE
OPERATOR	TO £6,000 + 15%	LONDON	1 YEAR NOT NEC.	OPS SUPERVISOR	£9,500	MIDDLESEX	5 YRS TSO/JCL
			DEC	TEC SUPPORT	£10,500	LONDON	7 YRS DOS/VSE
WANG OP	TO £10,000	LONDON	2 YEARS	OPERATOR	£7,500	BEOS	5 YRS VSAM/CICS
HONEYWELL 6 & DPS 6 OPS	£6,750	WILTSHIRE	1 YEAR	TEC SUPPORT	£9,000		2 YRS OOS/CICS
							5 YRS OS/JCL

CONTRACTS

SWIFT CONSULTANTS

We require appropriately experienced staff to work in London and design formats for SWIFT inputs. Also to provide consultancy and training.

ADABAS

Analyst/Programmer to participate in a VAX to IBM conversion. Extensive experience of COBOL and ADABAS is essential.

DEC VAX

We have a number of requirements in and around London for VAX BASIC and COBOL programmers.

IBM SYSTEM 38

We have three requirements for RPG III Analyst/Programmers specifically with experience of BANKING/FINANCIAL applications.

TANDEM

We require programmers who have worked with NS1/2, QUADRA/AN experience preferred but not essential.

OUR CONTRACT REQUIREMENTS ARE CONSTANTLY CHANGING AT SHORT NOTICE. PLEASE
TELEPHONE 01-439 1666 FOR FURTHER INFORMATION

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We have two clients with requirements for programmers with extensive experience in Micros using either of these languages.

MVS SYSTEMS PROGRAMMERS

Two interesting vacancies exist for systems programmers, one OS/MVS and one IMS/MVS.

ICL HDMs

A company in London requires a number of Cobol programmers with solid DMS Cobol experience.

HP3000 FORTRAN

We have an assignment in the East Midlands for an Analyst/Programmer. The successful applicant will have the opportunity to gain experience of QUIL.

IBM SYSTEM 34

Our City client requires a number of analyst/programmers with an in-depth knowledge of Banking, preferably with MIDAS.

PL/I CICS

We have several requirements for senior programmers in London and the Home Counties.

REDIFON DATA CAPTURE

A large financial establishment in the City requires system trouble-shooters with Redifon experience.

COBOL CICS/DL1

We have a number of requirements throughout London and the Home Counties for programmers with in-depth experience in these areas.

DATABASE DESIGN

A long contract in the City is available for a consultant to recommend and install a Database for a merchant bank.

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Soptr House, 169-173 Regent Street, London W1R 7FB
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ANALYST/PROGRAMMER

IBM RPG II

£9,500
+ MORTGAGE

Our client is an established Financial Institution based just North of the City of London. Due to critical and forward planning a new machine will be installed during 1984 to replace the existing System 3. The successful candidate will have a major role in the selection and implementation of the new hardware (probably IBM System 36 or 38), develop and enhance the existing range of financial systems, have extensive user contact and education especially during conversion and parallel running. This is an important new position which our client recognises as vital in order to further develop the services offered to their customers and accordingly require:

- ★ 2 years' RPG II
- ★ Good user skills
- ★ Some analysis
- ★ Preferably some financial programming
- ★ Enjoy a challenge

In return for:

- ★ A groundfloor opportunity
- ★ An excellent starting salary
- ★ 4% mortgage (after qualifying period)
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In the first instance please contact Sean Orsler at Apex.

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COMPUTER SYSTEMS MANAGER

Required for fast growing independent retail group of department stores who will be central to the day-to-day running of our Dartford BSC computer system to be implemented in 1984. You must have sound knowledge of retailing and retail systems, and be experienced in developing and maintaining systems which are relevant to our operations in retailing. Salary to £12,000 p.a. plus benefits. Apply to: MR. G. L. STONE, COMPUTER SYSTEMS MANAGER, UNIT 8, LYTTONS TRADING ESTATE, BUDWELL ABBEY, MIDDLESEX, UB9 4PL. Tel: 0895 445511

ADA - ADVANCEMENT!

SURREY/HANTS
Our large-scale US backlog of Ada is set to become the major challenge of the future. Our clients, the Strategic Systems House, have ten openings in their Ada development programme - using VAX/UNIVAC.

If you have real time/real time systems experience and seek £20-£25K then here's your opportunity to stay one step ahead in Software Technology. Call Vincent Melling NOW on 01-549 8441 for further details.

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Location: London/Home Counties.

For immediate consideration, please send full cv to David Camidge, Personnel Manager, CSC UK Computer Sciences Company Limited, Heathcoat House, 20 Savile Row, London W1X 1AE. Telephone 01-439 6252.

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For this position a very good knowledge of DL1 and CICS is required, together with the ability to assume responsibility for the work of a small number of programmers. Program design responsibilities will be mostly on-line but batch experience is also required.

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The person will be responsible for design and development of software to meet specific application requirements of European clients. A minimum of four years' experience of Computer Programming in an Engineering environment is required. Experience of Fortran is required. Experience in Design/Coding or use of CAD/CAM Systems for Mechanical Engineering would be an advantage.

SENIOR SOFTWARE ENGINEER (OPERATING SYSTEMS)

The person will be responsible for giving advice and support to Calma personnel and customers across the range of Calma Computer Systems. Experience in the use of VMS is essential. A minimum of four years' experience of the use of computers in an Engineering environment is required. Experience in one or more of the following areas would be an advantage.

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The successful candidate, a graduate, will have a good appreciation of computer capabilities, experience of a variety of hardware, including sound understanding of the DEC range of machines, be able to communicate effectively and show flexibility in problem solving.

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CUSTOMER ENGINEERING

PARALYSIS would soon cripple the entire business world without the services of the people who tend ailing computers - customer engineers.

The term customer engineer seems to be preferred to such alternatives as maintenance engineer because it indicates an important element of the job: the engineer is there to look after the customer.

"The field engineer must be able to go in, touch ruffled feathers, and fix the problem quickly," said Mike Hill, a recruitment consultant at All Executive who specialises in customer engineering jobs.

What is the nature of the customer engineer's job in 1983? Often it is to simply replace faulty module, this being the most expedient way of getting the machine running again. More exhaustive fault finding and repair is left to in-house engineers at the branch or centralised workshop.

The job title customer engineer refers to a range of jobs almost as diverse as the equipment to be maintained. It includes in-house engineers who may be called to customer sites to provide technical support if the field engineer cannot solve the problem.

Paul Whiteley, ICI's manager of organisation and manpower for the UK division, says that the job title customer engineer refers to a range of jobs almost as diverse as the equipment to be maintained. It includes in-house engineers who may be called to customer sites to provide technical support if the field engineer cannot solve the problem.

Jun Crieg-Gran, DPCE's engineering director, said that suitable trainees come from a variety of backgrounds: they may have O/A level maths or physics or an HNC or HND qualification; some are from the forces; with experience of radar or



The field engineer should smooth ruffled feathers.

sion, suggests that the role of the traditional customer engineer is becoming separated into two areas:

"There is a requirement for high calibre technically oriented people to go into top flight jobs which may combine both hardware and software support."

These will generally be graduate recruits.

Whereas many companies are now seeking graduates in an appropriate discipline for top level technical support jobs, the qualifications for recruits to the second category are more varied. For example, independent maintenance company Data Processing Customer Engineering (DPCE), an independent maintenance company, currently takes on four or five recruits a month with a balance between experienced personnel and trainees.

Jun Crieg-Gran, DPCE's engineering director, said that suitable trainees come from a variety of backgrounds: they may have O/A level maths or physics or an HNC or HND qualification; some are from the forces; with experience of radar or

radar and others may have worked on Post Office switching equipment.

"What we look for is the bright person with a natural ability to fix computers.

A TEC (technical education certificate) is another suitable qualification for potential trainees.

Whether they join a manufacturer or an independent maintenance company new recruits can expect to

receive classroom training on the products they will maintain and tuition to instil good customer relations skills.

Usually, several weeks of classroom training would be followed by on-the-job training alongside an experienced engineer after which the recruit would be assigned in maintenance of a product.

Having spent two or three years with their first employer some recruits move to widen their experience or gain promotion. Those in-house engineers who think they will enjoy dealing with customers may seek field service jobs with a company car and expense account but there are more people seeking such jobs than vacancies, according to Mike Hill, and the transition can be difficult as employers usually look for experience with customers.

Some companies seek a balance between experienced and raw recruits but many prefer to find staff who already have a couple of years experience.

Hewlett-Packard and a number of manufacturers including Digital Equipment and Data General in conjunction with City of London Polytechnic devised a two year course on which they sponsor 25-30 students each year.

A different type of training is required for engineers

maintaining computers used in industry, for example, in process control or online production control systems.

Jim Dick, who looks after the Engineering Induction Training Board's microelectronics and computer training programme, says that maintenance engineers for such systems need to understand the environment in which the computer is used as well as electronics.

The Board runs two types of pilot courses: they train experienced staff who have no previous knowledge of electronics and they provide training for newcomers to OND level with a brief basic in electronics.

Once an employee has reached the level of senior customer engineer the career paths are open to him, John Cunnell, Data General's personnel manager for the UK and Ireland, outlined Data General's fairly typical career structure.

Customer engineer salaries range from about £18,000 to anywhere between £20,000 and £30,000.

But anyone entering the field of customer engineering should note as further pre-requisite for success, it is the ability to adapt to changing circumstances. Already changes in procedures for maintaining computers are leading to possible new career patterns.

The computer healers

Margaret Spooner on the saving graces of maintenance men

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Now with increasing activity we're looking for the following additional customer and product support specialists to join a top level technical support group:

Front-end Processor Software Support

Three Customer Support Engineers are required, one to be based in Bristol to handle new business expansion, one to join an established team in Manchester, and one to join Support Group HQ in North London.

The main tasks will be to help and advise customers in the use of software for IBM-plug compatible programmable communications controllers, to install software at new customer sites, and to respond to customer-reported software faults.

Applicants should have a background in VTAM/NCP systems programming in a large IBM environment and have a good knowledge of one or more of the following: EP, ACF/NCP, MAF, SRM or NTO, plus experience of Assembler. For the Bristol-based post, applicants must be capable of solving complex problems with minimum assistance and have strong communication and interpersonal skills.

Visual Display and Hard Copy Systems

Two Product Specialists are required to support a comprehensive range of IBM-compatible data terminals. These are high level positions calling for tact and diplomacy and an ability to carry out discussions with senior customer management.

Applicants must have at least 2 years' relevant systems engineering experience, ideally on IBM 3270 or personal computer systems. Some travel will be necessary, possibly spending up to 2 days away at a time.

STC Business Systems

Front-end Processor Systems

A Product Specialist is required to support the 380X range of programmable communications controllers. Activities will include working on-site with customer senior technical management and field-based support staff; high level interfacing with suppliers; and vetting the applicability or feasibility of proposed enhancements and engineering changes.

Applicants must have extensive IBM systems programming experience, preferably on IBM 3705, and a thorough knowledge of VTAM and NCP.

Distributed Data Processing Systems

Two Product Specialists are required to provide high level support to the 3840 Distributed Data Processing cluster system, currently marketed only in Continental Europe. This will involve answering queries and solving problems by telephone, posed by foreign customers, marketing and technical personnel in the field. Some travel may be necessary to European centres for presentation and training purposes.

Applicants should have a strong software bias and experience of either IBM systems in a communications environment or of personal computer microsystems. More important, however, is versatility and enthusiasm and a willingness to fill in any gaps of knowledge. Foreign language ability would be an advantage.

Word Processing Systems

Three Product Specialists, one with a strong software bias, are required to provide high level technical support to the ITT 3100 Scribe multifunction word processor series. This could eventually lead to diversification into teletext/electronic mailing systems.

The software oriented specialist should have a good knowledge of Intel 8086/8088 Assembler; implementation of CP/M and CP/M-86 operating systems; communications protocols; and some experience of word processing packages.

For the other positions a background in field engineering involving modifications to hardware and firmware would be ideal, preferably backed by an interest in software.

Facsimile Transmission Systems

A highly experienced fax specialist is required to provide high level support to field engineering and marketing departments handling an advanced range of CCITT Group 2 and Group 3 systems. Activities will include liaison with manufacturing departments and suppliers; identification of design problems and input to design amendments.

Applicants must have a sound background in fax and copier systems plus extensive knowledge of communications protocols and firmware modification.

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Lion Systems Developments, currently Britain's number one manufacturer of data communication systems and products, are expanding their operation to include a brand new purpose built Headquarters, situated at the edge of the Chilton Hille, adjacent to junction 8 on the M40 in the village of Stockenchurch.

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CUSTOMER ENGINEERING

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We are the UK Headquarters of General Electric (USA). Here at Radlett we design and manufacture high value medical diagnostic imaging equipment, including the Body Scanner.

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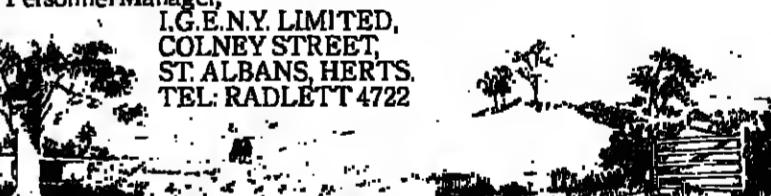
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In addition we have vacancies in these Departments for more junior positions, i.e. Section Leader or Senior Engineer.

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INFORMAL DISCUSSION INVITATION call in at: THE SAXON INN Southern Way, Harlow, Essex. Tel: Harlow 22411 on WEDNESDAY 15th JUNE 1983 between: 4 pm - 9 pm

or, if this is not convenient please telephone or write to: David J. Lunt, Personnel Manager, I.G.E.N.Y. LIMITED, COLNEY STREET, ST. ALBANS, HERTS. TEL: RADLETT 4722



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JUNE 16 ISSUE

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Compec North was launched in 1981 to serve the demand for a well-organized, well-promoted, professional show in the computer-conscious North. Its success and growth over the past two years is evident from the reaction and interest already shown by exhibitors in the '83 exhibition. Their demand for space this time is greater than the two previous years.

To coincide with Compec North the June 16 issue of Computer Weekly will contain a special recruitment feature covering the computer job market in the Midland and North of England. Topics covered will be relevant and written by industry experts and staff writers who will report on the current job scene for skilled computer people in this important and expanding area. This issue will be distributed in the normal way to all Computer Weekly

*97,226 ABC July-December 1982

readers throughout the U.K., and will also be available to visitors from the Computer Weekly stand at Compec North.

This issue is perfect for recruitment advertisers — the editorial environment is right, the target audience is captive, and as Computer Weekly has a total circulation of over 97,000 copies every week, advertisers can be sure their advertisements will be read.

To reserve space in this special feature
Phone (01) 661 8080 today.
Copy deadline is Monday June 13.

Computer Weekly

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A bachelor status contract is being offered extending two years and is renewable.

Free accommodation with leave periods three times per year plus free air tickets to the UK for each leave period.

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University Secretary

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This date 17/1/83 Ext 2314

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1983/06

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Applicants should be aged between 23 and 33 with at least 6 'O' levels, including Mathematics and English, and preferably with 'A' levels. A minimum of 4 years' DME/G2 and 1 year's TME experience is essential.

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Applicants should be aged between 20 and 30 with at least 6 'O' levels including Mathematics and English, and should have approximately 2 years' ICL operating experience, preferably on 02/DME/TME.

The Society offers competitive salaries plus an annual bonus. Other benefits include a non-contributory pension scheme, 20 days' holiday a year, a staff restaurant providing free lunches and the opportunity in the future to be considered for a staff house purchase loan at concessionary rates.

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Mr Carol A. Bird, Staff Assistant, The Equitable Life Assurance Society, Walton Street, AYLESBURY, Bucks HP21 7QW. Telephone: (0296) 33100.

1983/06

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Please apply in writing detailing your experience to Senior Personnel Officer, Balfour Beatty Construction Ltd., International Construction Division, Randolph House, Wellesley Road, Croydon, Surrey CR9 3QD.

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**ANALYST/PROG
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Our Client, a City stockbroking company with recently installed VAX equipment, is seeking an experienced BASIC Analyst/Programmer. They require at least two years' programming on Digital equipment and would be very interested in applicants with some VAX exposure. Salary and prospects are excellent and a valuable benefits package is offered which includes a high guaranteed bonus scheme.

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**PROGRAMMERS
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CITY c. £11,000+

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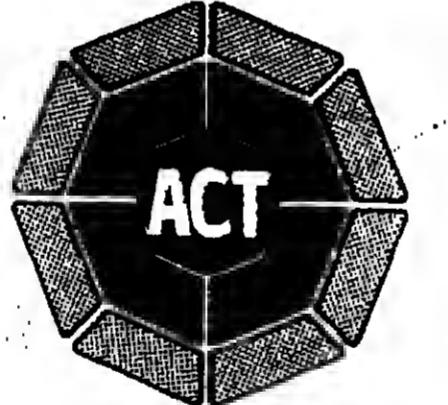
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(NEW INSTALLATION)

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Our client, a prestigious financial management organisation who currently utilise the service of a bureau, now wish to recruit their own in-house COBOL Analyst/Programmer who has around 4 years experience, of which 2 years has been spent in Systems Design, writing interactive applications, liaison with users, and using IBM DATA BASE TECHNIQUES.

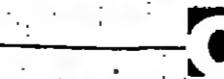
Your initial task would involve working with the service team on completing their current financial system, which would eventually be moved in-house to run on their IBM 4341 using CMS/VM, and from then on, design, develop and maintain other financial systems as required.

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PROJECT LEADERS West London to £12,500

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DEC SYSTEMS SUPPORT c. £10,500

A London based bureau - running client business on mainframes, minis and micros - is currently looking for a DEC Systems Programmer. You will be responsible for hardware installations and software upgrades end for supplying a hot-line service to users. The future plan of the bureau will involve you in setting up a total communications network. Ref. S3001/CW

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IBM SYSTEMS PROGRAMMERS Saudi Arabia

A software house urgently requires experienced DOS/VSE, CICS people to join their permanent staff. The first assignment will be in Saudi Arabia and subsequent posts could be in Europe. Ideal candidates would be single people who enjoy hard work, travel and want to retire early. You will be paid a UK based salary with related allowances for the country to be visited. Ref. 370

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Systems Programmer (MINI/MICROS)

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As a result, the Company now wish to make an additional key appointment, within their small specialist team, and are seeking to recruit a candidate possessing experience of systems software, encompassing specifically, operating systems and languages, gained within a mini or micro environment. Whilst experience in any of the following - MS-DOS, CP/M/86, UNIX, PASCAL, - would be most welcome, it is not essential, overall ability being more important.

As you might expect, with such a prestigious Organisation, terms and conditions of employment are excellent, and benefits will include a fully supported Company car, and generous relocation assistance, if required.

This position undoubtedly represents a considerable challenge and scope to an enthusiastic and career minded individual, and an unrivalled opportunity for personal and career advancement within a thoroughly professional and dynamic Organisation.

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Systems Quality Audit Manager

c. £12,000+Car

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The successful candidate will have a strong DP background, possibly encompassing Applications and Operational

Oxfordshire

areas, and will be capable of communicating with Managers, departmental staff, and users, with a high degree of tact and diplomacy. A good awareness of project and budgetary control, together with sound experience of report writing will obviously be required. Familiarity with BIS standards within an IBM environment would of course be ideal, but consideration will be given to those possessing suitable alternative experience.

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If you would like to be considered, please contact the Advising Consultants, **Martin Stainthorpe** or **Ian Payne**, on **081-836 8781** (24-hour answering service), or alternatively submit a detailed c.v. to the Birmingham office.

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PROGRAMMERS: IF YOU'VE GOT THE GET UP AND GO, YOU COULD GO UP AND GET £13,000

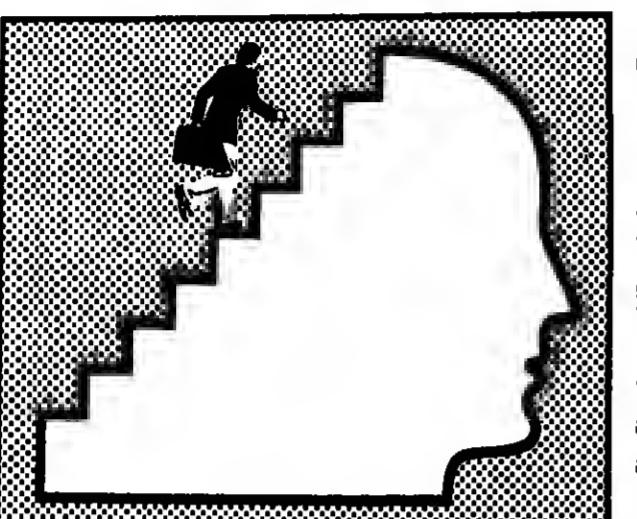
Comshare are looking for computer programmers and Senior programmers to work in Wakefield, Leicester and London.

On paper you'll need to be aged 21-31, with a degree, preferably in Computer Science or something not far off, and a pretty sound background in programming.

However, above and beyond that you'll need tons of enthusiasm and boundless energy if you're going to keep up with a young, expanding company like Comshare's stature.

You'll be working in our Product Planning and Development division, and will be responsible for the design, coding and testing of the software products that make up Comshare's Decision Support Systems.

The products encompass financial planning, business modelling, data management, data analysis and graphics, and are designed for micros, minis, mainframes and Comshare's own Worldwide Timesharing Network.



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SMR
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A Sales and Marketing Services Company

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The answer for many salespeople who wish to advance their career is to move to a progressive company that has the kind of opportunities available from our client:

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- * New, state-of-the-art products offer considerable sales potential.
- * Advancement into management is assured for those who consistently achieve sales success.
- * Attractive remuneration package provides both high earnings and other material rewards.
- * Many installed systems exist throughout Europe.
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- * 100% Club provides opportunities for overseas travel.
- * The company is well respected for its technical excellence and innovation.
- * It is a very much a 'salesman's company'.
- * Job opportunities are available in

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* Expected earnings are around

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The question is, do you have the appropriate qualities and experience to satisfy the needs of our client? Do you have —

- * The ability to negotiate knowledgeably at director or DPM levels?
- * Ambition, self-motivation and sound personal organisation?
- * Significant experience of selling computer systems or equipment?
- * The flexibility to handle both new and existing accounts?
- * The perception to qualify prospects effectively?
- * The experience and imagination to create an imaginative selling strategy?
- * A proven ability to achieve sales success?
- * The enthusiasm and understanding to exploit new product opportunities?

If so, we can provide you with a route to increased rewards and job satisfaction. All you have to do is contact Alasdair Scott in London or Roger Dodd in Lichfield, quoting reference WSC/053 and we will do the rest.

A WIDE variety of methods for calculating the remuneration of sales people generally fall into four categories: Salary only: many industries adopt this approach, particularly those whose product is primarily sold by means of merchandising and advertising (the salesman has minimal influence upon the ultimate sale). Few companies in the computer industry adopt this method, although one of the leading minicomputer manufacturers has always paid salary only and is convinced it is the most sensible way of rewarding and retaining the kind of salespeople it wishes to employ. I am yet to be convinced that salespeople achieve as much and act any more conscientiously when their performance is not income-related.

Certainly the components of sales rewards are limited: salary, commission, bonus. One could say there are only two elements: fixed and variable, but I prefer to describe lump sum payment, or those made as a result of company or other performance outside the individual salesman's control, as bonus as opposed to the directly geared effect of commission.

As for getting what you pay for — or more accurately, how you pay — one must bear in mind the kind of person likely to be attracted.

What kind of a person is a salary-only salesman likely to be? A team man who accepts the order, rather than makes the sale? A merchandiser who depends on heavy promotional investment? A consistent and average performer, rather than a high flier? A company man with management aspirations? A steady, long-term employee? One who welcomes supervision and expects regular training and management support, sometimes even assistance in selling? One who does not welcome prospecting or hard closing? One who feels no motivation to make that extra call at 5.30 pm on a rainy evening in Rotherham? One who can subscribe to comfortable apathy of "It's Wednesday, so it must be Wolverhampton"? One who lacks total confidence in his own ability?

On the other hand, is the commission-only salesman any more attractive? An aggressive lone wolf who leaves a trail of disruption? An erratic performer whose typically high performance cannot be relied upon? An independent, insular, even arrogant individual who hates supervision and training? One who concentrates on revenue, rather than profitability; quantity, rather than quality; oversells, rather than undersells? One who has no real ambitions to become a manager?

Is he one who is likely to concentrate on short-term gains by "skimming the cream" off a sales territory and leaving smaller, long-term business to more patient successors? A reactive individual whose economy of effort is often suspect, using "grapeshot" at anything that moves, rather than "sniping" at selected targets? One who generates a continuing flow of returned goods, cancellations and credit notes? One who seldom has a sustained relationship with any client?

There is no real evidence to show whether salespeople perform differently according to what they are paid. But in most avenues of life, one expects to get what one pays for. So I can see no reason why the rules should be any different to the code of salespeople.

On the other hand, experience suggests that salespeople do react to the way they are paid as opposed to the amount. So it is important to ensure that the construction of a remuneration package is geared to achieving the individual and cumulative objectives of company, product, territory and salesman. This cannot

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You must have at least 3 years experience in Real Time systems in one of the aforementioned areas of application. Our more unusual requirements are for German speaking Software Engineers to work in Switzerland for Incredibly high salaries, and Software Engineers for Dublin, experienced in VAX, COBOL, and a plus would be large Data Base systems.

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• evaluate, modify current applications • develop new applications • provide technical support to European subsidiaries.

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• graduated in EDP • at least 3 years of experience • COBOL knowledge • short levels in Europe • you will be based in our headquarters in Paris.

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92095 PARIS LA DEFENSE II Cedex 21 FRANCE

join the winning team

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SENIOR PROGRAMMER/ANALYST £8,367 to £10,277

PROGRAMMER/ANALYST £7,404 to £9,025

An opportunity has arisen for experienced and well qualified applications development staff to join the Computer Department.

A full range of applications, covering financial, administrative and management aspects of the Board's activities, are currently run on two ICL 2904s, 2904/2904/4 and a number of other minicomputers. In the latter half of 1983, a new system will take delivery of an ICL 2908 8Mb mainframe on which it is intended to run TP and data-base/IDMS-XI applications under VME.

Applications for the Senior Programmer/Analyst post should have at least 5 years' experience in computing and have held responsibility for the development/support of at least one major application. This is a permanent post.

Applications for the Programmer/Analyst post should have at least two years' experience in programming; have an aptitude for analysis and be able to work effectively with a minimum of supervision.

Experience in one or more of the following areas is desirable:-

ICL/CTI, Hardware/Software; Developing TP programs; Database (ODASY); Richard Pick adverbs.

Benefits:-

- * Cash allowances for special experience
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For further details contact Mr. J. McIlroy, Grampian Health Board Computing Centre, Witham Road, Abberley, Tel. 0522/41224. A completed application form should be returned to the Personnel Office, Grampian Health Board, 1 Albany Place, Abberley, by 23rd June 1983.

UNIVERSITY OF GLASGOW COMPUTING SERVICE VACANCIES

Applications are invited for the following vacancies:

OPERATIONS MANAGER

Ref. No. 4999

The person appointed will be expected to take charge of the operations division of the computing service and will be responsible for the day-to-day operation of the central ICL 2978 computer (due to be replaced by a model 2988 system in August) together with all the related communications equipment, astellite systems, and associated services.

Salary will be on Grade II (£11,180-£14,125) or Grade III (£13,515-£15,825) of the scale for other related staff, with placement according to age, qualifications and experience.

PROGRAMMERS (3 posts)

Ref. No. 5100

The successful applicants will work in the fields of Microcomputers, Communications and Software Support. Salary will be on Grade IIA (£7,180-£11,615) of the scale for other related staff, with placement according to age, qualifications and experience.

Applicants for the above posts should be in possession of an Honours Degree (or equivalent).

Further particulars may be obtained from the secretary of the University Court (Room 10), University of Glasgow, Glasgow G12 8QD, with whom applications (6 copies), giving the names and addresses of not more than three referees, should be lodged on or before June 30, 1983.

PUZZLE ANSWER

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3 7 9 8 4

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